RUTGERS, THE STATE UNIVERSITY OF NEW JERSEY

NEW BRUNSWICK

AN INTERVIEW WITH CANDY TORRES

FOR THE

RUTGERS ORAL HISTORY ARCHIVES

INTERVIEW CONDUCTED BY

KATHRYN TRACY RIZZI

BRANCHBURG, NEW JERSEY
APRIL 23, 2020

TRANSCRIPT BY

JESSE BRADDELL

Kathryn Tracy Rizzi: This begins an oral history interview with Candy Torres, on April 23, 2020, with Kate Rizzi. Thank you so much for doing this fourth interview session with me.

Candy Torres: Well, I appreciate it. I enjoy it.

KR: In 2001, you were working on the International Space Station. You went through training that you nicknamed the "Starfleet Academy." At that point, you had already been working in the space industry for several decades. During that training, what was new and innovative and what was perhaps antiquated and had been done like that for many, many years?

CT: The Training Academy took place off site at the United Space Alliance facility. Lectures, videos, and presentations were in classrooms. We learned basic protocol for working in the MCC. Experts from the different flight controller disciplines presented their field of operations. Astronauts came in to provide historic background. There were computer labs with interactive diagrams using animations for the different systems, such as electrical and fluid. It was important to know how workstations and equipment were laid out. Students could click on the screen to start and stop animation to understand how systems worked. We learned the layout of the ISS. We also learned the Space Shuttle because it was still flying in 2001. The architecture of the Space Station was complicated since there was no floor or ceiling. Essentially, it was all walls. We also took tests in the labs, just like any other academy. We also had to go to Mission Control to learn the MPSR [Multi-Purpose Support Room] console layout and equipment. Even though I was familiar with flight control operations from my early MCC work, it wasn't the same experience. There was no need for in-depth formal training for programmers. Before I was just sitting, watching other people. Now, I would be connected to one discipline with direct responsibility for ISS tasks. [Editor's Note: The Lyndon B. Johnson Space Center (JSC) is a NASA facility in Houston, Texas that conducts human spaceflight training and operations. The Christopher C. Kraft Jr. Mission Control Center (MCC) is located at the center. "Starfleet Academy" refers to training in the United States Alliance Training Academy. Maintained by space agencies in the United States, Russia, European Union and Japan, the International Space Station (ISS) is a modular space station that resides in Earth's orbit and can accommodate as many as six crewmembers. In 1998, assembly of the modules began in space. Astronauts and cosmonauts have inhabited the ISS continuously since 2000.]

KR: Was there anything that was particularly surprising to you?

CT: I don't think it was so much surprising. I was quite pleased with the academy training process. It was just very intense and very competitive, since I was one of the few older people. It was not a diverse group by age. I had more experience, so I knew a lot of the background already. Flight planning in the early days evolved into Operations Planning with new sophisticated tools. Before, it was just on-the-job training where you'd learn it and you'd apply it. This was now a formal program for just over a month. We had to do homework. We had material we had to study. We had to take tests.

In addition to Training Academy and the MCC, we went on tours to see all the facilities that helped support all space operations. Some of them, I had not seen before, such as food processing for living in space were off site. Food was tested, analyzed, processed and packaged

to meet a variety of requirements. Surprisingly, some food could be bought at the grocery store and not need any changes. Pudding is a good example of buy it and fly it. In the labs, food might need to be tested for outgassing in space to make sure that it wasn't going to emit some kind of unusual gases or materials when in space. It's a different environment in microgravity and underwent the harsh pressures of launch.

KR: Give me a sense of developments in the International Space Station during the early 2000s.

CT: Well, it was the very beginning, where NASA was starting to put ISS together. The International Space Station began with the launch of the Russian control module in November 1998. When I started working in Operations Planning, NASA had already put together the first two pieces. While I was working, we got to see the station build up, all the different modules being put on, the solar panels and adding modules. Eventually, they were getting to the part where they were putting trusses on, which are like a spine for the ISS. They have various connected unpressurized components on them, such as logistics carriers, radiators, solar arrays, and other equipment. A robotic system was added in 2002 to provide the ability to travel to work sites all along the truss structure.

The airlock was a really big thing. I was working console when the airlock was added to ISS [STS-104/ISS Expedition 2 on July 14, 2001]. I felt like I was watching science-fiction becoming reality. I started softly singing the words to the original *Star Trek* theme song, "Somewhere beyond the rim of the starlight …" We were in Operations Planning, so we would see how it was all planned, what needed to be done in terms of what pieces, how to go about it, what equipment was needed, how much time it would take, how much preparation, before astronauts would even get into their space suits and do the spacewalks. All those were part of the details put into the activities plan, plus the documents that the crew needed to do their work. We worked with a lot of different disciplines to get all that up there. We were part of the early days of putting ISS together, which took several years and lots of spacewalks.

KR: Give me a sense of what your job was on a day-to-day basis.

CT: None of us sat in Mission Control all the time. We would have our different work schedules. So, we might be on for six days or we might be on for five, depending on what shift you worked. We had three different shifts. We called them orbits. A shift began at seven o'clock in the morning and ended at three in the afternoon. However, handover between shifts could take minutes or an hour, depending on how much activity information needed to be shared to understand ISS status, which might push the first shift's leave time from three to four. The next shift began during that hour and lasted until about eleven. Then, they'd have handover, and the night shift began. There were weeks where we were not in Mission Control at all. We would be in our offices, working on different documentation or developing software to help with planning, giving presentations, going to meetings, working out the actual operations, the planning schedule. So, we alternated, a week on console, a week or two off. It really varied. There were a lot of people, so there was a lot of coordination in our various activities. Our managers would figure out people's schedules, the shifts they were going to work and when they were going to work Mission Control, as opposed to when they would be in the office.

It helps to understand how the group was structured. We had four positions in our Operations Planning group: Real-time Planning Engineer Support, Orbiter Communications Adapter, Real-time Planning Engineers, and Operations Planner. We trained over time to be certified in the different positions (RPE Support, OCA, RPE). The goal of most of us was to work towards the Operation Planner position--the flight controllers in the Front Control Room (FCR).

The people who put together the documents in PDF format and the translators were not in Ops Planning. We worked with all these different groups in the same Multi-Purpose Support Rooms (MPSR), along with shuttle people. The work was done in the MPSR and communicated to the people in the FCR--front room.

When we worked on console, we had our headsets on, so we were very focused on listening to groups that were not even in the room. They were in totally different rooms, different parts of the building, at NASA-Marshall Space Center, and Moscow. We didn't get with these people face-to-face. They were just voices. So, you'd have to learn how to listen to ten conversations going on in your ear, as well as people in your room, and be able to pick out when something was relevant and then key in on that particular conversation and hit the button too, maybe close out some other loops and focus in on a conversation with another group, and then chime in if you had something to say.

The first position was RPE Support. The tasks involved collecting documents and organizing them for the crew. RPE Support role coordinated all of this information, put it into a short document, a daily summary, and then that would get passed over via local network to OCA, who did the actual uplink, but I'd have to work with the people who did the documents. I'd have to make sure the translator's work was all finished and incorporated, write different summaries, collect these short paragraphs from different groups, put it all together into one format, and then hand it over, ready for uplink to the crew. That was just one document.

I had a lot of other things I had to work on, but that was the daily one, and that depended, again, on what shift you were on--usually the day shift. When everything was collected, it was put into a data package for OCA to uplink. It changes with the crew because they're not on the same schedule. Their day might shift by forty-five minutes, so that while at JSC, we were working on the day shift, the crew might be asleep or in the middle of their day. The ISS orbit, along with the Moscow and U.S. time zones, were responsible for this. It required listening to conversations on the loop for any questions or issues related to planning materials. It did not involve knowing the crew activities. Rather, it was a support position to RPE. It took months to learn on the job with a certified RPE Support, followed by supervised console work. When performance demonstrated the ability to work the loops, coordinate with RPE, OCA, translators and the PDF document personnel, then one was certified as RPE Support. It would be months before one began the training in the next position.

OCA provided direct two-way space-to-ground communication between Earth and the Space Station, up-linking data and downlinking data via a satellite. There were data files from RPE Support and coordination with Marshall and other groups outside JSC that were sent up. The crew also had experiment and systems data to be downlinked. ISS had to be within range of the communications satellite. The time slots--comm pass--would vary, so it took a lot of planning

ahead to make sure everything was ready to fit into the next available communications link. Most of the time, data transfers had to be broken up across time slots. OCA looked at when we were going to have access to the crew, access to their communications, their antenna systems, and how much time per pass. We had to figure out how much data could fit in that time period, because you wouldn't be able to get everything up at once. You might have to break it into chunks and wait several minutes or longer to get another chunk up. That all had to be coordinated, so it was a very complicated situation.

RPE was the actual planning person who knew the crew activities in great detail, who was doing what and when that would happen. This included wake-up and sleep time, pre and post-sleep, eating schedules, exercise, experiments, equipment management, spacewalks, housekeeping duties, maintenance, and so much more. Things rarely kept to strict schedule, because of things such as unexpected issues with equipment. The plan would have to be reworked to stay as close to the plan as possible.

The Operations Planner was the front room person who relied on all of the backroom folks to do the work. This person worked with the Flight Director (FD), who was responsible for the entire ISS operations with the "go" or "no" decision. The FD would turn to Ops Plan for confirmation of plan status and data communications.

KR: What was the work culture like?

CT: Work culture, well, it was hard because we were never all together in one place. We had different positions, groups, shifts, and office locations. We also had people in Moscow working in Mission Control there. It's hard to describe a culture because you're focusing on your particular work area, whether office or MCC. Working on console was a closed environment, since there were no windows, and we were not allowed to leave the MCC except for one person designated to run the food errand. Breaks outside the MPSR had to be very short. We didn't socialize much. There were people that did, but I didn't fit into the age group or interests. There was a cliquish atmosphere.

KR: What was it like when a shuttle mission would go to the Space Station?

CT: Well, then, we had to coordinate more with the Space Shuttle people at the other end of the MPSR room. Flight Planning was just one of the shuttle groups in the MPSR. It was the shuttle version of Operations Planning. They covered all the checklists and activities prior to the STS crew entering the ISS. Coordination started when the crew entered the Space Station: activities for the shuttle and station crews and their shifts. That would be several days; it could be a week or two, where we had to work together and plan. There was an overlap of working with the shuttle people then, so it was very busy. However, our tasks took place mostly through computers and on the loops, so it really didn't feel that different. It didn't have a significant impact on my work as RPE Support. [Editor's Note: NASA conducted the Space Shuttle program, officially called the Space Transportation System (STS), from 1972 to 2011.]

KR: During your time working with the ISS, were there any notable repairs that had to be made?

CT: On January 2, 2004, a minor air leak was detected onboard the ISS Expedition 8 (October 18, 2003 through April 30, 2004). There were only two astronauts onboard because the Space Shuttle was grounded. The leak didn't pose an immediate threat, but it was a concern. I was on console as OCA for most of the ten days it took to locate the source. The pressure leak fluctuated over that time period. There was a lot of concern about the NASA image and the ability to continue ISS.

[Editor's Note: Ms. Torres added to the transcript an entry from her journal recorded in 2004: "2:40 pm JSC-MCC Mon. 5 January. Soon after I came on, Ops Plan pointed out that ECLSS (Environmental Control and Life Support System) reported a slight but definite drop in air pressure on the ISS for the past week. It is being discussed with Moscow right now … 10:25 pm. ISS crew spent some time checking out valves. We're all hoping everything is resolved safely and quickly. The crew would have plenty of time to hop into the Soyuz--at this leak rate--but with no one to locate or repair, the ISS program would really be in deep doo-doo instead of space. We're all aware of being sensitive to any potential problems and handling them well."]

I wasn't on console on January 10, when the leak was found in the U.S. segment multipaned window.

KR: Now, the up-linking of information to the crew on the ISS, what was that like in terms of computers in the early 2000s?

CT: Well, we had several different systems. Monitors on console displayed high-level details on ISS. The computers were in a different part of the building. I saw them, but I don't know anything about them. Most of the work was done on laptop computers. Each position had the same equipment but accessed different applications, data, and documents. All ISS LANs [local area network] used laptops as the primary interface for the crew.

KR: What was it like for the ISS crew on a daily basis?

CT: They had the schedule of activities from Operations Planning, what they had to get done, when it had to get done, how long it would take, and there were a lot of different ones. So, they might have to start one activity and then go off and do some other activities. Checklists and documents provided the crew with the information to run things. Of course, you had several crewmembers doing different experiments and maintenance, because they had to do everything onboard. There was the downlink of data, the uplink of documents and data, problem solving. The work was constant, since ISS is 24/7 every day for years. That's why you needed so many people to coordinate all this stuff on the ground for it to be easier for the crew.

We also had email uplinks and communications for entertainment. We had to make sure that they got their movies up there. They had to have a life up there too. They had private time when they would communicate with their families and a different link to speak with the Flight Surgeon. That had to all be scheduled in there and what systems would be closed off, so that they'd have privacy. So, everything, every single detail, had to be planned.

KR: How much contact would you have with the American crew, either before they went or after when they got back?

CT: Well, I didn't have any contact. Over the years, I met astronauts from every U.S. space program, plus a few cosmonauts and foreign astronauts, but that was through JSC parties, passing them in the hallway in Building 4, seeing them in the Clear Lake stores and in the neighborhoods, and other places. I also had attended space conferences (Princeton, New York City, Virginia) since the 1970s, so I have a long list of astronaut encounters. As for work, we didn't have direct connection, except in meetings, but I was not directly involved with the crew. I was involved with the crew activities support process, because it's a huge operation. There would be people around the globe that would be working with the crew, and then those needs would go through many groups before it was passed on to us--actually, the Ops Planner and RPE. The crew would have input at that level. There was just too many people for the crew to be directly connected with that. The only direct connection I had was over in the communications section when I was up-linking, but I wasn't talking to the crew, because you don't have to talk to the crew to do that. The front room were the flight controllers, the ones that would communicate and meet with the crew and MCC personnel.

However, one day I did have a "Very Important Person" to escort into the MCC. Cosmonaut Yuri Malenchenko had married Ekaterina Dmitriev by video link, while he was onboard ISS and she was in the MCC. I wasn't on console on August 10, 2003 for the event. This was a controversial affair not happily sanctioned by U.S. or Russia, but the couple arranged for it to happen. Dmitriev posed with a life-size cardboard cutout of Malenchenko at the event. The bride walked down the aisle at NASA-JSC's Gilruth Center, which is an all event facility.

[Editor's Note: Ms. Torres added to the transcript the following journal entry. During the day shift on Sunday 31 August 2003, the "… Biomedical Engineer (BME) called Ops Plan asking if someone could escort visitors in about an hour. She is Canadian--foreign nationals can't escort people even though they themselves work in Bldg. 30 (MCC) unescorted. BME met me at my MPSR; I had heard over the loop that the visitor had arrived. The visitor turned out to be Yuri's wife, Ekaterina. She had come for the Private Family Conference (PFC). There was a problem, though, with permission for Ekaterina to pass through. Her astronaut dependent badge didn't specify 'Escort Required.' The guard wouldn't let her through even with a 'go' from the Flight Director. The security office upstairs had to call down with permission for Ekaterina to enter. It had taken several minutes and we had been close to the PFC time. … Anyway, she may have been late for the PFC. It sounded like they got it extended into subsequent comm pass. So I have met half of the first space wedding couple."]

KR: How do you think your previous work experience helped you in your job working with the International Space Station?

CT: Well, I knew a lot of this. Although I had not been working directly as back room support, I still was aware of the early days of how activities were planned for the crew. I had a lot of that experience. It had changed from before, because at that time, we didn't have as much in the way of computer capabilities. I was there when we didn't have the computer tools; we were just developing it. It was different, but it was still relevant experience of planning and also how

Mission Control worked. It upgraded my experience, but I already understood a lot of it. The new computers and the software had become very sophisticated over the years. In the intervening time between when I first came down from New Jersey and was working with developing the FAP and SCAP software, I had done lots of other types of jobs--human factors and other types of jobs--that were not directly Mission Control-related, but still relevant. Even my work at Princeton had prepared me. It was just learning the new software and the methods. Everything was always evolving, while I was in the Operations Planning group. They learned from past experience as they went along and upgraded as necessary and would say, "Okay, this process didn't work, so let's try something different." Eventually, NASA automated a lot of the uplinks for the data, the communications section. So, you didn't have to be there as much for the uplink, but I wasn't there when they actually changed all that over. I know they were talking about doing that. [Editor's Note: FAP refers to the Failure Analysis Program and SCAP to the Shuttle Configuration Analysis Program.]

KR: What are some of the high points and also some of the challenges during your time working with the International Space Station?

CT: I liked being there and actually seeing what was going on. We had the TVs going as well, so aside from our computers, we could see what was going on. When the Progress spacecraft approached ISS to dock, there were different camera views. I realized how beautiful the light and the colorations were. It was just abstract colors and shapes and forms. All of a sudden, it just snapped how beautiful it was, and I'd tell my coworkers, "Look, look, isn't that beautiful?" By the time they turned, the camera had been switched to the Soyuz, which is the black and white data, so no one ever understood what I was talking about. [laughter] The TV view was just switching back and forth, so no one ever saw that. They would only see the boring black and white, so their response was, "Okay, whatever." They were just focused on the jobs in front of them. I had my journal and I decided to sketch what I observed, so that night I could do the artwork. I sketched the images, wrote color codes, and described the movement. At home, I did it in colored pencil and acrylic painting. [Editor's Note: Developed in the 1960s, the Soyuz is a Russian spacecraft that can carry three crew members. From 2000 to 2011, Space Shuttles operated by NASA and Soyuz spacecraft operated Roscosmos, the Russian space agency, were used to transport astronauts and cosmonauts to and from the International Space Station (ISS). The Progress is a Russian cargo spacecraft used to resupply the ISS. There is always a Soyuz spacecraft on the ISS as an escape vehicle to return to Earth. Between the end of the Space Shuttle program in 2011 and the successful first mission of the SpaceX Dragon 2 Crew in 2020, NASA relied on Roscosmos to transport astronauts on Soyuz spacecraft and payloads on Progress spacecraft to and from the ISS.]

[Editor's Note: Ms. Torres added to the transcript the following journal entry: "2:12pm JSC-MCC Sunday, 24 March 2002. Got some awesome views of the Earth--ISS and Progress views. The Progress sees in black and white. The ISS sees the blue and white Earth. The OSS camera swivels its view of home to a view of itself. It is a beautiful show of colors and shapes. The colors shaded out wonderfully and shifted. For example the small center was white and changed to light sage green. Also the center segments started off round and eventually became a sharp set of squares. Progress is a square bordered star with a tiny satellite in awe. There was a terrific crisp view of the geometric forms. The color fluctuated."]

CT: Working shifts on console was challenging. Working days was fine since it was close to normal business hours and days. The evening shift required planning to do personal life and errands during the day when most people were working. There was no evening socializing. I didn't mind working nights since I'm a night person, but when I got home, I chose to sleep during the day until around four PM and have the evening as personal time. However, the evening felt constrained by having to be ready to work before ten PM. I didn't feel it was a relaxing time. In addition, some shifts require working a week straight, including the weekend. That was really hard. These frequently changing schedules led to sleep problems, such as insomnia or excessive sleepiness. It also impacted our ability to function effectively and at a high level of alertness. The work had lulls and then high activity, so work schedules between console and office had to take all of this into account.

KR: You had worked on human factors and then you were working on the International Space Station. What do we know about the effect of living in space on humans? I was wondering if you could provide some anecdotal evidence.

CT: There's a lot of changes in the body. On Earth, the blood pools downward. In space, it kind of moves throughout the body evenly, so the blood and body fluids tend to make the face look puffy. It affected the crew's sinuses. Of course, you don't have the balance, so it can cause some inner ear problems. When they returned to Earth, the crew had to reorient to gravity. Sometimes, people would go through space sickness, and you never could tell who would get space sick. That would last for a few days. So, that was something they had to deal with. Later on, they found out there were differences affecting the eyes and vision.

Also, you have to do a lot of exercise every day because you need to have your bones strengthened, and you'd have bone loss. Just like on Earth, with older people, bones start to deteriorate. Well, in space, that would happen too. For instance, they had the treadmill. A person can't just run on a treadmill if there's microgravity. So, they had bungee cords to keep the astronaut or cosmonaut on the treadmill with enough pressure to do the exercise. It would benefit the joints and knees with that pounding since bone growth requires it for strength. There would be at least two hours of exercise every single day. You could not cut back on that because all the rest of the time, your muscles and body weren't being used in the same way. Exercise was extremely important, as well as, of course, the food that they ate. There's a lot of work on those kinds of factors, as well as bathing issues and other things like that. It all impacts how you live and work in space.

KR: For the record, what is space sickness?

CT: Oh, like sea sickness. Your inner ear just doesn't know what's going on. Your body is just reacting to different changes that's not the same, that you don't realize gravity has a lot to do with, so you're just floating around and it takes a while for your body to adjust. I'm not into the medical, so I don't want to go into too much detail. The affected crew member won't well for a few days. There's no way to determine who will experience space adaptation syndrome (SAS).

KR: I have read about the food that the crew in the International Space Station eat. The food, because of the way it is packaged, is not very good but also the way the sense of taste changes in space. I was wondering if you could comment on that.

CT: NASA had to add spice to food because all those fluids in the head affected taste and smell. Food needed a stronger taste. They like the spicy foods. Also, with the food, before flight, a lot of water has to be taken out to make it lighter. The water was added later and sometimes to heat it up. Now, they're changing things. They're improving the way the food is done. At that time, there was the process of squirting the heated water into the food bag to warm it up. Then, it's manually mashed to mix up the food. But there were things that NASA could buy at a regular grocery store, like pudding. It would be something the crew can enjoy without any changes made to it.

Preparation varies with the food type. They couldn't have regular bread because floating bread crumbs could go in the eyes, into the filters, and throughout the station. Tortillas were substituted for bread. Some foods can be eaten in their natural forms, such as brownies and fruit. Other foods require adding water, such as macaroni and cheese or spaghetti. Of course, an oven is provided in the space station to heat foods to the proper temperature. There are no refrigerators in space, so space food must be stored and prepared properly to avoid spoilage, especially on longer missions. Condiments, such as ketchup, mustard and mayonnaise, are provided. Salt and pepper are available but only in a liquid form. This is because astronauts can't sprinkle salt and pepper on their food in space. The salt and pepper would simply float away. There is a danger they could clog air vents, contaminate equipment, or get stuck in an astronaut's eyes, mouth or nose.

KR: What about sleeping?

CT: The crew had to stick to a sleep schedule, and sometimes they had to sleep in shifts. It varied depending on the number of crew onboard. They had their schedule laid out with certain activities pre-sleep and post-sleep that had to be done. All of that had to be strictly determined. In microgravity, astronauts are weightless and can sleep in any orientation. They have sleeping bags because they're just floating. They attach them to a wall or small crew cabins, so they don't float around the station and bump into something. Without a down direction, they don't need pillows. Also, the crew wanted to be in a bag because their arms tended to float in space, and I remember early on, that would scare a sleeping astronaut. Imagine, you're sleeping and, all of a sudden, something's in front of your face. They wanted a way where their arms weren't going to be floating and scare the heck out of them. [laughter] They needed to get a good night's sleep.

KR: What other things, events, experiences stick out from your time working with the ISS?

CT: Well, it was just great to be part of the largest internationally collaborative engineering project in history. I was there from the beginning, even when I was with Ron Croston and Associates working Configuration Management (CM). ISS construction began in November 1998, just about three months after I started that job. It took a while for me to understand what an expedition was and manifests because there wasn't any formal training for that where I worked. It was explained to me as I learned to do CM.

The ISS group was different from my previous space industry groups in the sense that the mix of the people that I worked with was not very cohesive. There were not many with lots of experience at NASA or space work. There wasn't the kind of integration that there could have been through management. We had mostly young people who had graduated from college and were all excited they got into the space industry. They were in charge because they were there before me, but they didn't necessarily have the background, the history I did. People new to the group were at the bottom of the rung and were viewed as not having any experience. My experience was not incorporated. A lot of them didn't get to know me and what I was capable of doing, and so there was some differences in viewpoints. I could have been utilized a lot better, but they were all excited that they had been put in these leadership positions and had done all this stuff. It was a handful that were status driven while the others went along. There were some issues with that, which didn't work well for me and a few others too. There should have been more diversity in terms of age and experience and incorporating people, making a routine.

KR: How is that different from when you started working at Johnson Space Center in the 1980s?

CT: Oh, we had different age groups. We had different ethnic groups. We had different personalities. But the bottom line was that we all respected each other, and we just had a lot of fun. It was just natural. When we got into Space Station, it was a whole new thing and a new generation and a new way of doing things. But also I think they were so interested in getting young people involved, they put an emphasis on that, plus there were different issues with professionalism. When I started working at Princeton, the first day at Princeton, all I was told was I'm a professional, and so that's how I always worked, as a professional. When I was with Space Station, there were issues with professionalism that caused problems within the group, a lack of professionalism, poor work ethic. You can have fun at work, but you're representing not just yourself and your own interests, you're representing a company. You're representing the space industry. See, for me, I never took it for granted that I would be in the space program. During that time period, we (ordinary people) weren't even expected to work in the space industry, we didn't even know what the jobs were. So, they took for granted that they got this job, "Hey, yes, I got into the space program." They didn't realize really how much work it took and how much of a privilege it is, because there are so few people in the world that get to do that kind of job. Whereas I always knew how much effort went into getting to work in the space industry and I never took it for granted. I am so grateful for having worked so hard and making it there. The others went to prestigious schools and got the job but didn't always appreciate what really went into it. The environment was too competitive, and it didn't have to be competitive. Everybody had jobs, everybody had a place, everybody was going to move up.

KR: I would like to ask you a broad question. You worked in the space program starting in the 1970s and then you are working through the '80s, '90s, 2000s. Trace the major trends or changes that were going on in the space industry decade by decade.

CT: Well, I didn't have continuous work in the space industry. Let's start in the '70s. I was in high school during most of the Apollo era and in college for the last two. Skylab and Apollo-Soyuz occurred while I was in college. There were probes, landers, and satellites sent to other

planets. Plans for the Space Shuttle began with the *Enterprise* being a test vehicle with its rollout and first flight while I was at Princeton.

The 1980s were dominated by the STS program, the Space Shuttle. However, just as I was starting my work at JSC, President Reagan directed NASA to build a space station within ten years. This decade saw many designs and redesigns under the name Freedom.

In the 1990s, the *Space Shuttle* continued, and in 1993, President Bill Clinton invited Russia to join the program as a full partner. Other countries became part of the renamed International Space Station. The Space Shuttle was vital to the construction of ISS, although it began with a Russian module launched and docked robotically on a Russian rocket.

The twenty-first century marked the early ISS stages and, unfortunately, the decline and end of the Space Shuttle. During the downtime between the *Columbia* accident and return to flight, President George W. Bush announced the retirement of the Space Shuttle program. The vehicle was necessary for building the ISS. Main construction was completed in 2011, which was the year of the last Space Shuttle flight. Without STS, ISS became depend upon Russian spacecraft for supply and transport. The Constellation program was the planned replacement for the STS, but it was cancelled. The Space Launch System and Orion were to take over, but development took more time than expected.

KR: What came next for you after 2005?

CT: My whole life changed. I don't know if you want to go into all that kind of stuff, but I had to take care of my mother and I had to move her down from New Jersey to Houston. Being a caregiver to begin with and then when she fell and broke her hip and then starting this new job, it was extremely stressful. There was no support groups for people who were caregivers, and at the same time, it was a very highly competitive group that I was with. The manner in which she died affected me. It was extremely traumatic. I didn't know I was dealing with post-traumatic stress disorder (PTSD). Eventually, I lost my job, not because I couldn't do it, but just because of the dynamics of the group. The hostile work environment made me very ill. I was put on disability and lost everything I had worked towards. I'm still dealing with consequences of that work situation.

KR: You have termed yourself a Technorican. Where did that term come from?

CT: Well, I also wrote poetry. One of the books I had read was Nuyorican Poets Café, and that's very urban, New York. [Editor's Note: Founded in 1973 by Rutgers professor Miguel Algarín, the Nuyorican Poets Café was a center of the Nuyorican arts movement, the cultural movement of poets, artists, musicians and writers who are Puerto Rican or of Puerto Rican descent. It is now a non-profit organization located on East Third Street in Manhattan.] I found the book and I thought it was great, but it's very rough. It's really rough. Growing up, we were told we're Puerto Ricans. Well, then, there was a change, at one point, I was told I was a Neorican because I was rediscovering my roots. Later, I was called a Nuyorican because I was from New York and not Puerto Rico. None of these terms are what I grew up with. It was crazy. The way I was brought up, we were Puerto Rican. It was a discussion with myself, and part of it was influenced

by the Nuyorican Poets Café. There was a particular poem by Tato Laviera, where he used the term AmeRícan. I played around with these different terminologies. Somebody suggested that I call myself a Houstorican or Texarican.

I created "Technorican" by combining technology and Rican because I'm a Puerto Rican who uses technology. That's my brand name. As for my ethnicity, I call myself Boricua, when I realized my ancestor roots were the natives of Puerto Rico. It's out of respect for them and it covers whether one is born on the island or not. Then, there's a phrase that's well known in our culture, "I'd be Puerto Rican if I was born on the Moon." It doesn't matter where I was born, I'm Puerto Rican. My genes are the same. It wouldn't matter whether it was the island or anywhere else, my genes, all the genealogy don't change. I use the term Latino to make it easier for people, but I realize they don't really understand us. A lot of us are proud of our individual heritage. They're lumping us all together. I'm going back to call myself Puerto Rican and then, like I said, I'll say Boricua, if I think the person understands what I'm talking about. We're Puerto Rican no matter where we're born, and that's why I named my book that, *Born on the Moon*. It's also like an alien experience. [Editor's Note: Boricua refers to a person who is Puerto Rican and often refers to a Puerto Rican living in the United States. The roots of the term "Boricua" are traced to "Boriken," which is the name given to the island by the indigenous inhabitants of Puerto Rico, the Taino. Ms. Torres is the author of *Born on the Moon: Living in the Space Age*, published in 2020.]

KR: Tell me about the work that you have done self-employed as a Technorican.

CT: Well, I have a lot of products that I design. Since I do photography, Zazzle is a place where you can create products to sell online and internationally. I started off using my photographs of space. I'm going to find one of my products. There, I've got it. [Editor's Note: Ms. Torres shows her phone wallet with a photograph of the Space Shuttle *Atlantis*.] It's a phone wallet. You see I can put my credit cards in here, and my phone's off to the side. That's my photograph on the cover. Zazzle has a lot of different products online. I don't have to buy anything. I don't have to buy inventory, take orders. I just get online, I choose whatever products I want to sell, put images on them. I do it, not just for the money, but this as an educational tool. It's called passive income because the product is found internationally and I receive an email when something has been purchased.

I remember I was in Puerto Rico a couple years ago. I was on the beach getting a beach umbrella. I was going to go swimming, and the guy who was working to rent the beach umbrella saw my phone wallet. He said, "That's great, I always wish I could do this," and so we got into a conversation. I eventually said, because he was in his thirties, "It's not too late. You can still do something." I got his information, and a while later back in Houston, I collected some NASA material. There was a SCH [Space Center Houston] event with astronauts available for autographs. Joe Acabá, the first Puerto Rican astronaut, was there, so I got his autograph and I sent it to this guy. I wrote, "Yes, this really is Joe Acabá's autograph," and it had his name on there, "To Oscar." Now, he never wrote back, but I'm sure it was very exciting for him, this person I met on the beach was all excited about space and he gets this little packet of cool space stuff.

Online through Spoonflower, I design fabric for clothing, curtains, bed sheets, and other sewing projects. It's a way of making money but also educational products, and they're sold all around the world. I'm not active in the marketing, but I get messages that I've sold products. In terms of the fabric, actually my Puerto Rican designs are the more popular ones. I don't make money off of space merchandise, even though this is my photograph. It's not unique enough to draw customers. There is a lot of space stuff. So, I had to find an area where there wasn't as much competition, so that's why I started to do Puerto Rican designs based about Taíno petroglyphs. I don't make much more than pocket change. Marketing is my weakness.

I occasionally get public speaking engagements. Again, marketing is not my strong point, but I've been able to speak in Florida, Washington, D.C., Princeton, Chicago, Houston, San Antonio, and California. Sometimes, I speak for an hour or two, and other times I speak for a whole day or even a few days. I get paid to speak, as well as for travel, hotel, food. Speaking is really what keeps me alive. I love traveling number one, but I love talking about and sharing my experiences.

KR: Candy, tell me about the photograph that is on your wallet. What shuttle is that?

CT: This is the *Atlantis*. I just know by looking at it. In 1994 and 1996, the shuttle landed at Edwards Air Force Base in California, because conditions weren't suitable for it to land at Kennedy Space Center. It had to go back to Florida for launches, so the shuttle was put on top of a Boeing 747 to be ferried across country. Sometimes, they would fly over Houston and land at Ellington Field. This was one of the times the public was allowed to come and see them. I haven't been able to confirm which year it landed at Ellington Field, where I took this photograph. [Editor's Note: Two Boeing 747s jets were modified to become the Shuttle Carrier Aircraft. Each jet was able to have a Space Shuttle placed on top of it to transport the shuttle back to Kennedy Space Center in Florida from Edwards Air Force Base in California. One of the 747s, N905NA, is now displayed at Johnson Space Center in Houston with a replica shuttle on top of it.]

I know I have another photo of *Columbia*, where we were allowed to go inside the 747. There was nothing to see inside with the seats and wall coverings removed, but I went in there. I started talking with one of the guys. He was one of the volunteers in charge of the 747. I started talking to him and told him I was a pilot. Well, he allowed me to sit inside the cockpit of this 747. As I sat in the pilot's seat, I thought to myself, "Oh, my gosh, just feet above me is the shuttle." I have those pictures. Plus, now, this 747 is at Space Center Houston (SCH). At the end of the Space Shuttle program, the different shuttles were going different places. Houston did not get a real Space Shuttle. They got a replica, but they got the real 747. It arrived at Ellington in 2012 for its installation at SCH. I have pictures of it in the middle of the night being towed down NASA Road 1 in my neighborhood to its present spot. So, it sits just a mile from me. I go over and I say, because its number is 905, "Hi, 905, how are you doing?" Space Center Houston has all sorts of exhibits inside.

KR: Which of your speaking engagements really stick out in your mind?

CT: Well, they're all different and they're all wonderful. I spoke at Miami-Dade College in 2015. I spoke in front of these students who were interested. They created a really nice poster, "STEMversations with Candy Torres." I did two sessions, and at night we ate at a Puerto Rican restaurant afterwards. Oh, it was awesome! The hotel I was staying at was not far from the Opa-locka Airport that Amelia Earhart was to fly from. A nearby park was named after her. [Editor's Note: When Amelia Earhart began her attempt to fly around the world in 1937, she started her journey in Miami. According to the *Miami Herald*, she arrived in Miami on May 24, 1937 and mistakenly landed at the wrong airport, the 36th Street Airport, which is now part of Miami International, rather than the larger Miami Municipal Airport just south of Opa-locka. Then, Earhart and co-pilot Fred Noonan launched their around-the-world mission on June 1, 1937 from Miami Municipal Airport, first stopping in San Juan, Puerto Rico. On July 2, 1937, Earhart and Noonan took off from Papua New Guinea and were never seen again.]

I spoke at the National Air and Space Museum (NASM) in Washington, D.C. through the Smithsonian Latino Center for their event "Hispanic Innovators in Air and Space." I was there at my table with the Apollo 11 capsule right behind me, literally, just a few feet behind me. I mention that because I had met all three Apollo 11 astronauts years before at NASM. Even better, I actually was facing the door where I had seen them in '79. I was so excited to be there, I didn't even want to stop to eat. It was just non-stop talking with people, sharing. It was an informal thing, a table with my space photos and artifacts. I was just on a high. Of course, now, I've totally forgotten what the question was because I'm off on a tangent. [laughter] [Editor's Note: Neil Armstrong, Buzz Aldrin and Michael Collins were the three astronauts to serve on the Apollo 11 mission. Armstrong and Aldrin successfully landed on the Moon on July 20, 1969. Collins remained in the Command module, orbiting the Moon.]

KR: I asked you about which of your speaking engagements was your favorite or really sticks out in your mind.

CT: Well, the other one I was going to talk about was in Chicago, where it was all-day event. I did four presentations to middle school, college and the public. I gave three for middle school and then they had high school and college and then the public. That event stood out for me as well. At Princeton, I spent three or four days. I gave a presentation to young girls at a small conference building just a block from the Astrophysics Department, where I used to work. My keynote speech was in the same hall that Albert Einstein used to give his lectures. I have a cutout of Albert Einstein, of me standing next to him, but in the very same hall that he spoke, there I was, I spoke, awesome! I spent a couple of days with students of every public school in South River, elementary, middle, and at my high school, when I got was inducted into the Wall of Fame. So, those are the ones that stand out. They make me feel alive.

KR: How did you feel when the shuttle missions ended in 2011 and *Atlantis* was the last shuttle to launch? How did you feel then?

CT: That was very sad because I live in the space community, and although I had not been working for a while, they had set up the Aerospace Transition Center (ATC) for space workers. A lot of people lost their jobs. You don't end a program for us to go into space without having one to follow up. It was just not the best way to do things. So, that wasn't good. I met the

people, even though I wasn't directly impacted, I hung out there, and the people had said they were supposed to be working on some other projects, such as the Constellation crewed spaceflight program. I only overheard there were some issues with that. The money wasn't used wisely. People lost their jobs, and a lot of people were saying, when they were in the group, whatever company they were with, they'd look around and they realized, "Hey, we're all about the same age too." So, it made it harder for people because they were all fifty and up, looking for jobs. There were fewer jobs. It really hit the whole community, the Clear Lake community. [Editor's Note: NASA's Constellation program was in operation from 2005 to 2010. Its goals included operations for spaceflight to the International Space Station, the Moon and ultimately to Mars. It was canceled due to lack of funding.]

These people couldn't just transition to jobs in oil and gas. They were trying to compete with people who had experience in oil and gas. They'd have to go through training for it and still not be competitive. ATC was there for a couple years, for people trying to find jobs. Some people never made it back into any kind of job. One just went to his farm and stayed there. It was a shame that a woman in her seventies with awesome experience was having trouble finding a job. She had worked on the lunar mission, I think on the Lunar Excursion Module. People with tremendous amounts of space work experience were just kind of lost. Also, a lot of the charity organizations that people donated to then suffered. People couldn't pay to help others. They were now on the receiving end. A lot of businesses closed up. So, this whole Clear Lake area around NASA really, really suffered a lot.

I was showing up at ATC and trying to find my own work. I'd seen 3-D printing on Stephen Colbert. I got interested, and then I researched. I'd tell people, "Why are you trying to compete in an area such as oil and gas, where you don't have experience? You're running with the herd and you're getting run over. Here's this new area, 3-D printing. You don't need a degree and it's just growing." When I went to a Houston conference, I had actual examples to bring to the ATC because I couldn't explain to them what 3-D printing was. I showed people, and then they started seeing articles about its uses. I said, "You should be getting into this; it's open. It's the way you can go and start doing it." Look where it is now. A lot of people just still didn't get it. They were stuck in the traditional way of looking for a job. Some of them were starting to see things about it but still couldn't picture themselves in there, whereas I got involved in 3-D printing and I know how to do it. I've used the software. I was trying to get them to look at things differently with great jobs, growing jobs. [Editor's Note: Stephen Colbert is the host of *The Late Show* on CBS.]

KR: What do you think about the companies like SpaceX that are now doing the missions that NASA used to do? What do you think about that? [Editor's Note: NASA's Commercial Crew Program (CCP) partners with companies such as SpaceX and Boeing to develop the capability of U.S. commercial crew space transportation to and from the International Space Station and low-Earth orbit.]

CT: Well, I think it's great that we're actually getting some innovation. For a long time, it was said that companies could not afford to do these kinds of things. That's why you had to have NASA and NASA funding, that companies didn't see a way of making a profit. Finally, we got to a point where people who had their own money and really had the dream of space would

actually go out and do this. So, it's great that they're doing it. It's a lot of work, but they managed to learn a lot in really a relatively short period of time. I know a few people who went to the new space launch companies that had just wonderful ideas for getting us back into space. It's great.

KR: You think it has actually fostered innovation.

CT: Oh, yes, definitely. Landing that reusable rocket instead of dumping it into the ocean was unreal. To see that actually come down onto a platform and land, that's amazing. It didn't work the first time, but neither did everything work in the space program in the beginning either. There are other spacecraft concepts under development similar in form to the Space Shuttle that will land at spaceports, airports adapted for the new vehicles. I live near the Houston spaceport at Ellington Airport. [Editor's Note: The Falcon 9 is a reusable, two-stage rocket used by SpaceX to transport people and supplies into orbit.]

KR: What are other new developments that you think are exciting?

CT: Well, that we're going to be going back to the Moon. I'm just excited to learn the whole process of what they're doing in terms of a station outside the Moon. "Thought Leadership" sessions over at Space Center Houston are talking about that, the whole process of different stages of going to the Moon. NASA has started putting out proposals for the different elements they will need to be able to build the different things for going to the Moon. It's not going to be just going to the Moon like we did before. It's going to be a presence with the station orbiting the Moon and then being able to deliver supplies and be able to make excursions.

KR: What do you think about the prospects of humans traveling to Mars?

CT: I'm focused on the Moon. It's always been how can you go so far away and spend all those resources when we don't know how to live and work in space beyond the Moon? Plus, the Moon is a lot closer. They've been dealing with this for decades. In the '70s, I attended the space colony conferences about living and working on the Moon, how you'd be able to develop the habitats that would deal with the radiation. Actually, more recently, there was a book by Paul Spudis about how we should be returning to the Moon and developing commerce. It would be coming down more to a business, that a lot more people could be involved in and a continuing operation. Mars is so far away: the number of people who can go is limited, it takes a while to get there, and are they going to stay permanently? I think it's great to go to Mars, but I believe in this Moon phased step. We still have a lot more to learn about living and working in space full time. We're still learning a lot on the Space Station, and that's over twenty years. To go to a place like the Moon, you can actually get back to Earth a lot quicker than you could if anything happened on Mars. I think it's great, but I'm more focused on the lunar things. That'll happen, and it's more likely to happen in my lifetime. [laughter]

KR: As you and I have been meeting to do these interviews, the world has been going through the COVID-19 pandemic. I would like us to talk about that.

CT: Okay.

KR: What have your experiences been like, in the past, say, six weeks, as we have all been going through this COVID-19 crisis?

CT: Well, I published my book. I was able to go out and do a storytelling event in downtown Houston on Tuesday, March 12. That was great because many people sign up, but only ten people get selected. I happened to be one of the ten that got selected on my first visit! I was able to get on stage and tell my story in five minutes. It was great, loved it. Then, the Houston Rodeo had been shut down the next day, Wednesday. Saturday, I had my first book signing down the street from my apartment. I didn't have a lot of people come in because Houston was already starting to suggest limiting socialization. For the short time I was there--four hours--I was selling a book almost every fifteen minutes for a while, but there just wasn't enough traffic. I was looking forward to doing more of that. I was just starting to contact some bookstores.

It's been frustrating for me because meeting people is my element. That's what keeps me really energized, and I haven't been able to get into the online stuff yet. Without Wi-Fi in my apartment, I have to sit in my car by the fitness center to do this interview. This is not good for me to try to have a real interaction. Plus, I have to learn all of that. I need the Internet access. I like the face-to-face human interaction, and not having that is going to take a while for me to figure out. I've created a couple videos for PBS *American Portrait* and they just sent me the testimonial that they used for advertising. So, I've been in contact with them. I've gotten my message out that way, but it's not the same as people seeing my book, hearing my stories, me interacting with them. I'm hoping that when I get the Internet access in a couple days, that'll start changing. [Editor's Note: PBS *American Portrait* is a program where Americans can upload their personal stories. PBS then airs the videos on television and online.]

KR: How has the COVID-19 crisis affected the community that you live in in the greater Houston area?

CT: Well, I'm way out from the center of Houston. It's a very residential area. I can walk around. I'm cautious, but I'm not in a tight space where I have to worry all the time. I can walk outside, walk around my apartment complex. I can go to the store. I've just started wearing the mask because people are starting to wear face masks. We're going to have to start wearing them on Monday. The stores were empty; that was very strange, like a science fiction movie. I watch the news and get a better sense of how other people feel. We're in an area where we don't have a high number of people. We're kind of out of the center of it. I'm sure there are COVID cases around, but the news hasn't been clear on how many different parts are affected.

KR: When you watch the news and you see what is going on in the country, what strikes you as scary and what strikes you as hopeful?

CT: That people are keeping social distance and yet not freaking out, just going about doing their thing, and it seems to be working. I'm not hearing any crazy stuff, like protests or anything like that. We see that people really believe that we need to be careful about reopening. It's hard to fight something you can't see. That's been the weird thing for our heads to wrap around the fact that this is real. You can't see it, but still it's on TV and we know it's real. It's a lot of

anxiety, and I've read that people have strange dreams. My dreams and my anxieties have increased. It's reassuring to see that it's the same thing other people are going through.

KR: Have you had much alumni involvement with Douglass College?

CT: Well, there have events been official alumni in Houston a couple of times a year and I would go to those events. That was really nice. They'd be held in town, which is about twenty-five miles from where I live. It's central for most people, so I have to go farther in, but that was really enjoyable. I don't know when we're going to do the next one. It's going to be a while.

KR: Have you gone to any of your reunions?

CT: I graduated in '76, but I don't have a bunch of friends from that year that graduated with me. All my friends are from different class years. Right now, I can't afford to see any of them, but we keep in touch one way or another.

KR: Right.

CT: Commuters are different. It's not the same as if you lived in a dorm for a year with somebody or several years or a group of people. I just don't have that kind of graduation-year connection.

KR: You are a self-professed space nut. What does it mean to you?

CT: Space activist.

KR: Space activist. What does it mean to you to have done what you have done in your career?

CT: I've always been able to see the big picture and prepare for the future, not just for myself. I connected with Gerard O'Neill and other space activists at Princeton. I always found people interested in things about the Moon and living in space, that was in the '70s. We're not just talking about Gerard O'Neill's space colonies, but we talked about going to the Moon. We talked about lunar resources. I met Bill Agosto in New Jersey, who did a lot of research about the Moon and all its possible resources. He and I started the New Brunswick L-5 Society Chapter. A lot of people don't realize a lot of the stuff we're talking about now is not new stuff, such as solar sails. I think to myself, "Oh, yes, that was back in the '70s." It's taken a while for things to become reality. It's not just the technology, but politics had to come around. It's taken decades, but the future I and others envisioned and worked towards are beginning to happen. [Editor's Note: Gerard O'Neill (1927-1997) was a physics professor at Princeton University who also worked at NASA and advocated for space exploration.]

I feel like we are futurists, not because I have a master's degree, but as a kid, I was always looking at the future. I was a futurist. I was born a futurist and a visionary, being able to see possibilities and then, after a while, seeing that other people had the same ideas. For example, the women's liberation movement started, and I had already liberated myself. When I was sixteen years old, I thought, "Oh, there are other women who are thinking the same thing." I

wasn't the only one; I wasn't "weird." It's the same thing with space, when we were actively involved in conferences and events to educate the public about space exploration and the possibilities. Now, it becomes more common to see people, and especially women, talking about their work in the space industry.

KR: Well, I have reached the end of my questions.

CT: Okay.

KR: I would like to ask, at this point, are there stories that you would like to add or things that we have skipped over that we may have missed?

CT: We could go into a long thing, but we won't. I knew I wanted to be an astronaut early on, and aside from Civil Air Patrol, I was always trying to find ways of doing things that I thought might help me. So, I took scuba lessons. This was when I was still in New Jersey. Unfortunately, I never did get certified. I got seasick, so I couldn't even put on the wetsuit to get into the water. I tried again in Houston, but the weather didn't work out and so it just never happened. I did go to Cozumel with the JSC Lunar Fins Club to snorkel, so I had the gear. I also played underwater hockey, which is a fun but brutal game!

In 1983, I was still in New Jersey, when I heard about amateur radio being used in space. Amateur radio, also known as ham radio, is used for non-commercial communication for hobbyists and emergency purposes. Owen Garriott was the first astronaut to use it from the Space Shuttle. His activity showed NASA amateur radio as a useful tool for getting students actively involved in space exploration. When I started work at JSC, I joined the ham radio club. In 1985, I participated in the Shuttle Amateur Radio EXperiment (SAREX) project as a member of the JSC ham club. It was the first video between Earth and the Space Shuttle, a historic event and contribution to increasing public participation in space exploration. It was not part of my job. It was a club, so there were things like that I was involved in. I assisted in modifying the JSC antenna tracking software so we could follow the shuttle as it orbited overhead. I also operated the video equipment, assisted the crew's family recordings, and called up to the shuttle, though I didn't get an answer. The crew was busy with experiments. The club wanted a logo, so I asked my artist friend to work with me on it. I found a printer for the stickers and shirts. As far as I know, I don't remember other women there, but I definitely was the only Puerto Rican. [laughter] That was really important. I mean, that was historic. Everyone takes for granted that we see video from space. Well, it wasn't like that in the beginning, and I was part of the group that helped start that. [Editor's Note: Owen Garriott was a NASA astronaut and crewmember of the Skylab 3 and STS-9 missions. On STS-9 in 1983, Garriott operated the first amateur radio call from space.]

The other things, I was also a competitive fencer. In 1998, I found a local club to pick up the sport as a competitor rather than just playing around. I trained and practiced to participate in competitions and went from local to Texas and then national competitions. It was so much fun! The equipment made me feel like a super hero. My goal was to qualify for veterans international competition, which was possible starting at age fifty. I worked hard and reached my goal in

2004. I had the money and time to travel to Austria. I was the first and only person in our club to accomplish that!

My dream continues to be that perhaps someday some way I can make it out into space. I don't want my ashes thrown out there. I want to be a living, breathing person going up there. I still have that hope, but it is heartbreaking to be here and see all these other possibilities and that I might not be able to participate in them. My whole life was about space.

KR: You would go into space if given the chance.

CT: Oh, yes, that was the point. Of course, to share the experience, not just going, but saying, "Hey, people, this is great. This is the reason why we're going into space." That's what I wanted to do with my book and the public speaking, to really let ordinary people know that it's a possibility for them and it is humanity's future. There are those of us who got interested, but those who don't have a place. There's a great commercial on TV that shows a janitor sweeping in Mission Control during space operations. The voice says, "People like this allow these other people to do their jobs," something as simple as that. There's lots of work for all sorts of people. Sewing spacesuits required women who knew how to sew. There are jobs for everybody, and that's what I talked about in one of my speeches. Whether it's here on Earth or if we go into space, we need people of all skills, and that's everybody's future.

KR: How are you doing with your battery for today?

CT: It's still black. It's getting low, but it's still black.

KR: Okay, good. Is there anything else that you would like to add?

CT: Well, I am a renaissance woman, science, technology, art, writing, languages, travel, sports. The Museum of Fine Arts-Houston (MFAH) owns one of my murals. I wrote a grant proposal to create a mural at a community center or library. I was one of four artists selected, the only amateur artist, and the only woman. My artwork is mixed media around six feet by sixteen feet at the Chicano Family Center. We had to produce the work in the MFAH during visitor hours, so people could see how an artist works. They enjoyed being able to see our various processes and designs as well as ask us questions. Of course, this is a larger story!

I've done some space art, such as Joe Acabá in his spacesuit, abstract impressions of rocket launches, and Moon craters. I've thought about doing images of lunar colonies. If I can't live on the Moon, maybe I can make my own little models, take pictures, and then do some photo editing. I save odd little pieces of plastic. There's this little corner of my cabinet where I store them. Eventually, I'll get around to taking them out, lay them around, take pictures, and then from there, work in Photoshop. It would be to educate others too about space, think about their future, think about living in space. So, I need to do a lot more work refreshing my knowledge on the Moon and its resources. I started doing some of that reading, but I need to do it more heavily. I can only do one thing at a time. First, I need to get online, talk about my book, and get people to know me as a person and a brand and a story to interact with. I need a publicist!

KR: Well, I thank you so much for doing this interview series with me.

CT: Well, I appreciate working with you. We got it to work. We finally got it to work. [laughter]

KR: Yes. What I am going to do is I am going to end the recording, but off the record, I would like to talk with you about a few things, if that is okay.

CT: Sure.

KR: Okay, all right, good.

----------END OF TRANSCRIPT----------

Transcribed by Jesse Braddell 4/30/2020
Reviewed by Kathryn Tracy Rizzi 7/21/2020
Reviewed by Candy Torres 9/21/2020
Reviewed by Kathryn Tracy Rizzi 10/16/2020