

The Sublime Key

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6am Tuesday

Miles Fletcher woke up to a crick in his neck and the sound of seagulls squawking on the roof. He had fallen asleep again on the office couch. It was 5:30am and the skylights were starting to brighten the software company office where he worked. He had laid down around 3am while trying to find an intermittent bug in his code.

“Damn, he thought. Is it really morning? I still haven’t gotten this user story finished. Time for a shower and some coffee and then back at it. I have to get this done before our 10am scrum meeting.”

Miles stumbled down the stairs on his way to the office gym where the shower was. The sales bros would be showing up soon for early morning workouts and he would prefer not to deal with the insults and ridicule they tossed around.

The Tympani Industries office was half software office and half maker space, built into a renovated pier in San Francisco’s Embarcadero. The pier was originally built 100 years ago from first growth redwood and concrete blocks. Most of the interior redwood and concrete was retained during the renovation and augmented with steel cross bracing to bring it up to seismic standards.

Under the stairs at the back of the office, the company CEO, Stephen Tympani had a private wine and whiskey cellar. Other than the solid wood plank floor, the cellar was essentially a bank vault with concrete block walls and a solid one-piece redwood door. Instead of a sidelight window, there was a large flat panel LCD display that showed the interior of the room. It was a neat setup - there were displays on the inside and the outside of the door and a HD camera on both sides. It was all run by a Raspberry Pi computer located in a box inside of the door. The effect was like there was a window in the door.

As Miles walked past the door, he noticed something odd in the LCD display. Stephen Tympani was lying on the floor in a pool of blood.

Miles immediately called 911. While giving the dispatcher the location and a brief description of the emergency, he tried the door. Of course it was locked. The only person with the key was Tympani himself. He was inside and from the looks of all the blood, probably dead. There was no way in. And no obvious way for the murderer to have gotten out.

Miles went to the front of the building to let the paramedics in when they arrive. He wracked his brain about how to get into the room. He knew the lock on the door was a custom unit made in their in-house maker space. It could be locked and unlocked manually with a key. He also knew the lock had a timer to prevent people from propping the door open. From time to time, someone would forget to close the door and an alarm would go off. The alarm was an audio clip from some classic arcade game and he would hear it from his desk upstairs. He was pretty sure it would automatically lock itself after a minute or two.

He knew that Tympani had one key, but there must be another one somewhere. He could see the big red emergency release button behind a glass panel in the room, but that didn't do him any good from the outside.

Within a few minutes, fire department paramedics arrived at the front door. Miles let them in and took them to the back where the locked room was. On the way to the room, Miles told them about the room, the locked door, and the camera/video screen setup. They didn't understand. "Whadda you mean, there's no way in?" the paramedic scowled. "There's supposed to be a fire key for all rooms in all buildings. It's part of the building code. How do we know there's even anyone in there? It could be a hoax."

They got to the door and now the paramedic was really agitated. He could see Tympani on the display panel and desperately wanted to get to him. He could have been dying while they were watching. The paramedic got on the radio and asked for someone to bring in the jaws of life to force open the door. Miles said, "Hey, I have an idea - give me a second". He ran upstairs and grabbed his laptop and ran back down. He sat down at the desk nearest the door and opened his laptop. "Let me see if I can hack into the computer and unlock the door".

He poked around on the router and found an entry that probably was the door's lock and display computer. It was pretty obvious – it was called Typani_Cave_Door. He tried to log into it using the default username and password and failed. He tried a couple of other obvious passwords which also

failed. Even if he could get in, he wasn't sure he'd be able to quickly figure out how to open the door. Perhaps it would be faster to call the IT folks.

The paramedic's comment about the fire key jogged Mile's memory. Didn't they hook the door/lock up to the fire alarm system when they designed it? It's got to be wireless. Miles thought they probably just sent a signal to an open port on the door computer. Miles fired up Python and started to write a port scan script for Tympani_Cave_Door.

It occurred to Miles that the IT person who set this all up wasn't the type to do something too cryptic. Miles thought, "I bet she used something obvious, like if 'fire' is sent to port 911, it unlocks the door." Miles tried it. Bingo, the door clicked unlocked. The display on the outside of the door started flashing red and the whole office fire alarm went off. Miles shouted to the paramedic - "It's open, go in. I guess we could have just pulled the fire alarm."

The paramedic rushed right to where Tympani was lying, leaning over to avoid the pool of blood. With a practiced eye, he noted Tympani's color, felt his lack of pulse and immediately knew he was dead. "We're too late to help him - this is one for the police and the crime scene techs"

Miles went to the desk where left his laptop. No way he'd get a shower and time to figure out where his bug was now. First thing, he had to calm himself down. Next, he called his boss's cell phone and let her know what had happened. It was after 6 at this point and she was awake but still at home. She said she would call the senior VP, HR and whoever else needed to get in front of this. She said she thought there might be a crisis plan in place, but wasn't sure it had this in mind.

At some point during his phone call, the fire alarm was silenced and the police showed up. There were a couple of officers and then someone in plainclothes who Miles thought might be a detective.

The detective walked into the cave and carefully avoided touching anything. The cave itself was a large room 30' wide, 30' deep. With the cold bay waters a few feet below and the typical San Francisco foggy climate, the room made a perfect wine cellar. Tympani had it built out with the concrete walls and the special door.

The floor was solid redwood planks and the ceiling was reinforced concrete with exposed conduit for power, lighting, and internet. The rest of the office had exposed HVAC ductwork, but not in this room. Instead, there was a row of small casement windows high up near the ceiling that let some light in and were set up to automatically crank open a few inches if the temperature inside was too high and the temperature outside was low. There was no way the murderer could have got in or out of these

windows. They were too small for a person to fit and there was no way to reach them from inside the room. Once outside you'd be hanging over the bay on a sheer concrete wall. There were stacks of wine crates that someone could have shifted around and climbed, but none were apparently moved. Along one wall was a bar displaying dozens of high-end wines and single malt scotch bottles. Some of the whiskey bottles had been previously opened and sampled.

Near the back of the room there was a desk with a laptop computer, a large second display and an office chair. The office chair was pushed off to the side. It looked like Tympani had been sitting in the chair and tried to get up when he was attacked. The crime scene techs were busy taking pictures of the body, which was still lying on the floor near the desk. Even from the doorway, it was clearly homicide.

The detective stepped out of the doorway and asked "Is the person who called 911 here?"

Miles stood up and said it was him. The detective gave him a friendly smile, "Hi, I'm Sgt. Chris Martinez, what's your name?". The detective took down Miles' name and address in a little notepad. He asked Miles if he had called 911 and what happened. Miles told him. When Miles told him about the locked door and the camera/display system, the detective said "Slow down with the technobabble. Explain it to me like you would to your grandmother."

In the background, a 3D printer whined away annoyingly, making some widget. The detective asked to get a conference room away from the noise.

When Tympani bought the pier, he had it retrofitted for his company using only recycled or reclaimed materials. The front quarter of the first floor was reception space, boardrooms and other conference rooms and had a front stairway going to the upstairs. Past the conference rooms, there was a small enclosed space that held weights and a couple of exercise machines. Next to the small gym were bathrooms with showers. After the gym and showers there was a large shop space. The back quarter was a small section of open plan office space and Tympani's cave. The whole first floor, except the gym and showers, had 20' high ceilings.

On the second floor, there were three offices for executives, conference rooms, and most of the open plan office space. There was natural light from windows and skylights on the second floor. There was a kitchen, coffee bar, and lunch area along one side of the second floor. It was one of the types of tech offices that had breakfast and lunch available for employees and a kitchen stocked with heat and serve meals.

The executives, IT and HR folks had desks in the front part of the second floor. The sales and marketing people were in the middle and the programmers in the back third of the building. Not all the desks were currently in use. They were growing and still had room to expand. Miles' desk was near the back of the 2nd floor close to the back stairs.

Miles led him to one of the front conference rooms. Detective Martinez asked "Is it ok if I record this? It will be easier for me than taking notes". Watching too many episodes of "Law and Order" made Miles a little nervous about this, but he agreed.

"Ok. About the door. There is a small computer on the inside of the room. It's connected to two cameras and two displays. The outside display shows what's on the inside camera vice versa. The net effect is like a window in the solid wall. So, when I came walked past the door, I saw the body in the display.

Detective Martinez asked, "How did you know how to open the door?" Miles explained that at first he didn't but the paramedic mentioned the fire key. After that, he knew there must be some network connection, probably via Wi-Fi. Networked computers use something called ports, numbered from 0 to 65535. The details are not important. Anyway, Miles explained that he was going to write a small program to test each port one at a time and see if he got a response. But, he got an inspiration to try a specific port number and it worked.

The detective said, "I'm not sure I really understand this, but I'll have our lab guys look at it. Lucky you were here to let them in, huh?" Miles let that comment pass. "It turns out anyone could have opened that door, you just have to pull the fire alarm."

The detective wanted to know one more thing about the computer display - "Does that computer display thing record video?". Miles thought for a second - "I don't know. It might, but HD video takes a lot of storage space. You couldn't store it on the little computer itself. It runs off an SD card without a hard disk. You'd have to upload it to the network somewhere. I didn't set it up, so I don't know for sure, but I don't think Tympani would want anyone to have a record of what goes on in his cave. He has parties in there sometimes and who knows what goes on in there."

Miles could see some of the early birds getting to the office through the sidelight in the conference room. It was going to be as far from a normal work day as anyone had ever experienced.

Detective Martinez then asked, "What can you tell me about the victim". Miles tells him that Tympani got rich in his previous startup - he was an early employee of an internet auction site. Tympani made a

small fortune by Silicon Valley standards - maybe \$100M. He was the primary investor in his new company but had taken a little VC money as well. He wanted to take it public, become a billionaire and one of the few tech entrepreneurs to have multiple successes. Despite this, he used Tympani Industries partially as his own private shop. He loved building things almost as much as he did making software for money. Miles concluded, "I don't know about his personal life, you'll have to ask someone else about that"

While Miles was talking, he could see the HR VP, Sharon Dowling glaring at him through the sidelight and was preparing to tap on the glass. Miles told the detective, "Hey, the HR VP is here. You should talk to her instead."

Martinez said "I'll talk to her in a second. I have a couple of more questions for you. Why were you here last night?"

Miles felt a sudden chill and realized he should be careful in answering. Miles told the detective that he was working late and fell asleep.

"Was there anyone else here?", Martinez asked.

Miles said "I think Rick Clements was here for a while. I didn't see him, but his motorcycle jacket was hung up in his workspace when I walked by. It was there sometime in the evening, but I have no idea what time that would have been and later it was gone. I was concentrating on my work and not paying attention to the clock. I had my headphones on so I didn't hear anything."

"Do you often work overnight?", the detective asked.

At this point, Sharon knocked and opened the door. "I need to talk to you, Miles", she said pointedly.

Miles stood up and introduced Sharon to Detective Martinez. Sharon told the detective they would completely cooperate with the police investigation to find out who assaulted and killed Tympani. She said she needed to know what was going on to put their crisis plan into action. She was organizing an all hands meeting for some time that morning and needed as much information as possible to craft a statement to employees. She also needed to brief the management team before the all hands.

The detective said to Miles, "Thanks for your help. If I have any more questions, I'll give you a call."

Sharon turned to Miles as he was leaving the room - "Before you answer any more questions, it would be better if you talked with me. We probably want to have someone from legal sit in with any conversations with the police."

Sharon said to Detective Martinez, "You'll probably want the card key logs to see who was here last night. I'll have my assistant copy email the logs for the last couple of months to you. You'll want to talk to our corporate attorney Joel DeAngelo too. Give me your number and I'll have him call you."

Miles went upstairs to the kitchen, got a bagel and lox schmear and went back to his desk. The last thing on his mind was how to fix his bug. His subconscious had its own agenda. He got a flash of insight on what the problem was with his program. Even though he should have been figuring out what to do about being a murder suspect, he couldn't help himself but dive back into his code. Next thing he knew, it was two hours later and his boss wanted to talk.

9:30 Tuesday

Miles's immediate boss, Lisa Weiss, was a former programmer who was promoted to management. This was Miles' first real job after college. One summer when he was at UC Santa Cruz getting his CS degree, he had an internship at the startup where Lisa was the lead programmer. After she had moved over to Tympani and Miles had graduated, she helped him get this job. She had been recently promoted to manager.

Lisa first asked Miles if he was doing ok after finding the body. "Everyone is in shock. There's going to be an all hands at noon and then they're going to send everyone home. We will be cancelling all meetings, including daily scrum and standup meetings for today. They both were kind of freaked out by the murder and retreated to talking about familiar technical matters. Miles told Lisa that he was there all night trying to finish the user story before the 10am standup meeting. He finished the code but was running into a problem. He told her he was pretty sure he knew what the problem was now. He didn't think he'd fix it in time for the, now cancelled, 10am meeting. He and Lisa chatted about the best way to fix the problem. As they were talking, several other developers arrived at the office. Lisa left Miles and went over to their desks to give them the news.

While Miles was meeting with Lisa, Sharon was huddling with the management team in the boardroom. She had texted all of them as soon as she was notified of the murder.

Anil Patel, the CFO and executive VP was the first to arrive. Anil had worked with Steve Tympani at their previous startup. He was a British educated Indian who spoke with an Oxford University accent. After moving to California to catch the 2nd wave of Internet startups, he'd ended up being the assistant to the CFO of their previous company

Next to arrive was Joel DeAngelo, the corporate lawyer. Despite the casual dress code in the office, he wore a dark grey suit and a somber tie. He was originally from Brooklyn and his voice sound a bit like the actor, Elliot Gould. He was giving direction to someone on his cell phone as he arrived, making eye contact with Anil and Sharon but keeping up his conversation.

A couple of minutes later, Rick Clements, the CTO arrived. Unlike Anil, Rick hadn't worked with Tympani very long. He had been hired about a year before from Apple. Unlike Joel, he was dressed in jeans and a polo shirt. He took off his black motorcycle jacket and put it on a chair.

Rick asked Sharon, "Where's Don?" Don Salmon was the Sales & Marketing VP and should be at this meeting. Sharon said "He's been out this week visiting customers in Boston. I called him earlier and gave him the news. He's either at Logon or on the plane, I'm not sure. We could try to get him on the phone, but it's probably better for us to meet and I'll fill him in when he gets here this afternoon. We have a lot to discuss. Joel, can you get off the phone, so we can get started?". Joel said a few more words on the phone and hung up.

Sharon began the meeting. "You all know what happened last night. There will be time to grieve and remember Steve, but we have to put it behind us for now and think about the future of this company. The first order of business is to affirm our leadership. According to the crisis plan, Anil is the acting CEO. It's up to the Board (of directors) to deal with a permanent CEO, but Anil's going to run things until then. Anil?"

Anil said "Thank you. Of course I will step in and serve. He got up and started writing an agenda for this meeting on the white board. Topics were:

- Internal communication (all hands)

- External communications (social)

- Legal issues

"Anything other topics that we need to deal with immediately?" Anil asked.

Rick said "Yes. As you know, we're at risk of a cash crunch. I was talking with Steve yesterday about cutting expenses. We need action on that front." Anil said "Yes, I agree, but let's table that and concentrate on what we need to do about Steve's passing." Rick was annoyed but held his tongue.

Anil started with the internal communication topic "I will address the company as acting CEO at the all hands. I've already met with Sharon and have some talking points. The basic message is that we grieve for Steve, but we need to keep working as before. I'll keep it short and then hand it over to Sharon to talk about grief counseling for those who need it. We'll tell everyone that they should go home and spend time with their families and come back tomorrow and expect business as usual. We'll announce funeral arrangements when they've been made." They talked about logistics and timing for a few minutes.

The next topic was external communication and social media. They decided to leave this for Don Salmon to run with. Sharon would put a basic announcement on Twitter and Facebook. Don would

orchestrate a social media campaign to minimize rumors. Sharon had already brought up the topic to Don when she'd talked with him earlier and would touch base with him again when he was off the plane.

Last topic was legal. Anil asked Joel, "How do we handle the police? It's pretty likely that one of the employees is the killer. We all want justice for Steve, but also need to protect the company." Joel advised "We must cooperate with the police, but make sure I'm aware any interviews. I may want to sit in. If they need data from any of our systems, turn it over to me, I'll send it to the authorities. We need to cooperate, but don't want to open ourselves up to civil liability by giving them more than they need. Sharon told Joel that she had a brief conversation with the detective and promised to get the card key logs to him. Joel asked Sharon to pass them to him and he'd give them to the detective.

As the meeting broke up, Anil said to Rick, "As you are well aware, the new version your team is working on is critical. We'll meet about financials soon, but make sure your team doesn't get distracted."

Joel had one of the few offices with a door that closed. He got to his office and shut the door. He then called the police detective to get an update and to arrange for any further interviews. Detective Martinez agreed to meet face to face at 12:45, right after the all hands rather than talk over the phone. He then talked with his assistant about coordinating with Sharon's team to get the card key data and the IT folks for the security cam video. He also asked his assistant to see if the cave door cam stored the video feed and get that too.

12noon Tuesday

The company held all hand meetings in the lobby with people in the back spilling over into the makerspace. A few minutes before noon, his boss stood up and suggested that everyone make their way downstairs for the all hands. It took Miles a couple of extra minutes to finish up his work, so he was one of the last ones to go down stairs.

As he walked down the stairs past the crime scene, 6am this morning felt like a week ago. He wondered if the cops really thought he did it and tried to put it out of his mind. He knew he had nothing to do with it and was worrying for no reason. He glanced at the desk that he used when he opened the door. It was a spare desk that no one used. There were several unassigned desks in the back here. He noticed something in the recycle bin that he hadn't noticed when he was working on the door. There was something in the blue recycle bin. These bins are emptied by the cleaning crew that comes in

around 7pm. So, it must have been dropped after they left last night. That's odd, he thought. I wonder how it got there. He grabbed so he could look at it later.

While they gathered and waited for Anil to start the all hands, Miles overheard a couple of his co-workers having a quiet conversation. "I hear that we're going to have layoffs" one said to the other. The other agreed "I didn't hear layoffs, but I did hear that they're going to cut travel and expenses. If we miss with the release, there will be layoffs for sure". Miles didn't hear more as the all hands started.

Anil spoke loudly to the group. It was a still a small enough company that they could do all hands without a microphone. Anil calmly told the gather company about the fact that Steve Tympani had passed away. He gave few details, but the grapevine had done its work and everyone knew he'd been murdered in his office. Anil continued, "The police are investigating and may want to talk with some of you. We will cooperate totally, of course, but if you do talk with the investigators, our company policy is to include Joel DeAngelo or his assistant in the conversation. I also want to remind you that we are running a business here. Whilst we need to take time to grieve, we have to meet our commitments. We have a critical release coming up and some key customer demos in the next few weeks."

He then said a few words about what a good man Steve was, how he'd be missed by all, and that Steve's family would announce funeral arrangements at an appropriate time. Sharon, from HR, then told everyone about grief counselling and that they were closing the office for the day. She said everyone should take as much time off as they needed, but let their supervisor know if they were taking more than a couple of days. Miles was sure that Lisa would let him have whatever time he needed, but her boss Rick would be on her ass if he didn't show up on time tomorrow. Miles didn't really want to take time off now anyway. The murder was shocking, but he preferred to keep his mind off it by keeping busy rather than mope around his apartment.

Miles noticed Brandy O'Shaughnessy at the front of the crowd. She was in the HR department, but Miles didn't know exactly what she did. She recently joined the company after graduating from SF State. She was blond, kind of short, with healthy breasts. She was the type his mother would have called zaftig. She always wore a musky perfume that would get his attention from across the room. He found her very attractive and had always wanted to ask her out. He had chatted with her a few times in the kitchen and lunch area and she always seemed happy to see him. He didn't know if she was seeing someone or not. If he ever ran into her outside of work, he would ask her out, but he wouldn't do it at work. It would be too embarrassing.

After the all hands, the office cleared out. Miles was invited to join a bunch of programmers who were going to have an impromptu wake at Pier 23. Pier 23 was a bar down the Embarcadero. It was once a blue-collar dive but was rapidly being overrun by tech workers. Miles told the guys he'd drop by later, but he had a couple of things to finish first.

Miles went to the kitchen, heated a bowl of prepackaged udon for lunch, and went back to his desk to eat. While eating, he fished out the scrap that he found in the recycle bin. It was a piece of tissue paper in the shape of a key. It had a trace of brown around the edge. Miles smelled it. Yep, it smelled burnt like it had been cut with the laser cutter. It could have been related to the murder, but a tissue paper key didn't seem likely. He shoved the paper into his laptop bag.

Since the office was pretty much deserted, Miles made his way down to the shop to see if he could figure out anything with the laser cutter. The laser cutter was turned off and there was nothing to give away how it was last used. No scrap material was left in it or other clues of who'd used it last. The recycle bin next to it had pieces of cardboard and some thin pieces of wood – scrap from people using it over the last few days. That was typical. This laser cutter was usually used to cut cardboard. Sometimes people used it could etch designs into soft metals or glass, but it couldn't cut them.

He looked at the box containing the laser cutter control computer. Even though the power was off, there were LEDs blinking. Could the laser cutter's computer be still on even though the cutter itself was off?

Miles went back to his desk to do a little googling. He found the type of control board computer and the Linux version used on this laser cutter. He found the default root password listed online and hoped no one thought to change it. Root on Linux is the admin or superuser login name and can do anything on the computer.

He was in luck. The laser cutter showed up on the network and he was able to login as root. He found the log file for laser cutting jobs. The last job was at 8:38pm the night before. The file was `c@rd1c3.DXF` on a thumb drive. The thumb drive had been removed so he couldn't examine the file itself, but the file name and timestamp was interesting. The `.DXF` was a common file format for laser cutter files. Was the filename some random temp file or was it 'leet' spelling? Miles wasn't sure. He'd never heard the word cardice before so maybe that wasn't it.

Miles put this aside for now and tried to finish the user story from earlier in the day. He couldn't concentrate and gave it up. It would still be there tomorrow. He left the office to join the other developers at the bar.

While Miles was hacking into the laser cutter controller, Joel DeAngelo was meeting with Detective Chris Martinez in the same conference room where he met with Miles early that morning. They made small talk for a minute. Joel assured Martinez that they would cooperate fully. He knew that an employee was possibly the murderer and the company was motivated to prosecute. Martinez thanked Joel for sending over the security video and card key logs.

Joel said, "I know you have a bunch of questions for me, but can you fill me in on what the Medical Examiner and crime scene techs have found?". Martinez warned him that this was all preliminary and it was confidential, but he'd tell him what he could. Tympani was killed by multiple lacerations to the neck and throat and bled out rapidly. The time of death was between 9 and 10 on Monday night. The murder weapon was a 3' long razor blade like foam cutting knife. The detective said, "We think Tympani was sitting at his desk with the back to the door when the assailant unlocked the door and snuck up on him. The assailant used the blade as a sword, viciously slashing at Tympani as he sat at his desk. Tympani tried to get up but bled out before he could stand. He ended up kicking off his Birkenstocks as he struggled to get up and defend himself. The assailant was wearing a welding glove that was left in the cave. We think the he or she was wearing a welding apron to protect against blood splatter. We found one with a few spots with what looks like blood. The lab will see if it's Tympani's."

"Do you think you'll get any fingerprints or DNA from the welding glove?" Joel asked.

Martinez said, "No, the surface is too rough for prints and it was from the pile of gloves. There will be DNA from anyone who's ever worn them in it. We'll try, but I don't expect to get anything useful. Likewise, with the whiskey bottle found on his desk." They had found a three quarters full bottle of Lagavulin Islay 12 year old scotch and one whiskey glass with a little left in it.

"How did the murderer unlock the door? Steve had the key. He usually kept it in the lanyard around his neck. Was it there when you found him?" Joel asked.

Martinez replied, "That's a good question. We don't know how the door was opened. There was a key in a lanyard around the victim's neck, along with his card key and BART Clipper card. Do you know if that's the only key?"

Joel thought for a minute, "I know there is one duplicate that Steve made when he put the lock in, but I doubt there are more. Steve was really protective of his cave. He gave me a copy for emergencies. I think it's in the corporate safe deposit box. If you want, I'll take you to the bank later to verify that it's still there."

Martinez agreed. Martinez started asking his questions. He first wanted to know about the cleaning service. Could they have done it?

Joel gave the contact information for the service and was pretty confident that Martinez wouldn't find anything. Martinez next asked about visitors to the office. Joel said, "It was a typical day yesterday. Before our meeting, I looked at the receptionist's calendar. There was a meeting with a vendor, one of our reseller partners was in and there were two job interviews. I'll provide you with the details, but it's pretty unlikely that any of these people were involved."

"That leads us to the employees. Can you think of anyone with a grudge against the victim?", the detective asked.

Joel agreed that there were often healthy professional disagreements, but nothing remotely close to violence. "We pride ourselves on fostering a culture of 'Mature Directness'", using the corporate buzzwords. Martinez wanted to know who had recently had a mature and direct interaction with Tympani.

As a lawyer, Joel was reluctant to speculate. "Why don't you talk with the management team and get a sense for yourself. I'll schedule an hour for each of them to meet with you starting 9am tomorrow. " Joel gave him a list. It was the same people who were at the meeting first thing in the morning.

"By the way, I may want to interview again the kid who found the body", glancing at his notebook, "Miles Fletcher. "

Detective Martinez saw that the computer forensic tech had texted him. He said he had to make a call and left the conference room.

Martinez called the tech back and asked, "Can you tell me who was in the building at the time of the murder?"

The tech said, "Dude, you're not going to believe this, but according to the logs, nobody was in the building that night, not even Tympani. I matched up entries and exits and they all line up. According to the file, Tympani left at 6:24pm and didn't return. Fletcher left at 5:57pm and didn't return. There is a side door that has a card key swipe to exit but no way in. There's no video there, so I can only validate entries. The video quality on the front door is pretty crappy and there is a blind spot in front of one of the doors. I wonder why they even bother."

Martinez said, "Do you think this is a computer glitch or were the logs deliberately altered"?

The tech said “I’m still confirming this, but if I had to bet, someone wrote over that day’s log entries with logs from an earlier day. If I wanted to cover up my entry and exit times, that’s what I would do.”

Martinez wondered out loud, “Why would someone who just killed someone alter the logs in such a clumsy way?”

When he was done talking with the tech, he went back into the conference room to finish up with the corporate lawyer. The detective finished with, “I’d like to get a copy of your financial statements and bank records to our financial analysts. I need to rule out a financial crime as a motive.” The lawyer agreed to gather the required documents from the controller and email them. “Oh, and I want to have my computer tech meet with your IT people. We’re not sure if the card key data is corrupted. I’ll have my tech join us for a while tomorrow. They then made their way to the safe deposit at the bank to check to see the spare key was still there. It was.

At Pier 23, given that it was mid afternoon on a weekday, there were only a few people there besides the Tympani Industries folks when Miles got there. He stopped at the bar to pick up a pint of Lagunitas IPA before sitting down. There were three tables of Tympani people already there. As he passed one of the tables, he said hi to Anna, one of the IT engineers he kinda knew, sitting with a table full of other people in IT who he didn't know. He saw several of his team members and his boss in animated conversation at one table. From the dirty pint glasses on the table, they were into their second or third beers by now.

He stole a chair from an empty table and squeezed in. He said hi to Lisa, and to three other programmers. Two were somewhat older Russian guys, Alex and Misha. At least older for a startup – maybe in their early 50s. They both spoke perfect but accented English. They were two of the only smokers in the office and could often be seen standing around the outside of the building with their cigarettes. The other guy was an Indian programmer named Ravi. He was a jovial sort in social situations and could get boisterous with a couple of beers in him.

Ravi and Alex were arguing about some sporting situation. Ravi turned to Miles, “Alex says the Russian National Basketball teams were better than today's NBA teams.”

Alex said “Best basketball team I ever saw was Soviet Olympic team in 1988. Could beat the Warriors 2014 team easy.”

Ravi and Alex argued about the different players on the team, who would guard who and how successful they'd be. Ravi said that nobody on that team could guard Steph Curry. Alex shrugged, “Might get hit by elbow. No flagrant fouls in '80s. It's hard to shoot straight with concussion.”

Ravi didn't have an answer for that and changed the subject. “What do you think of the US president. He reminds me of the Indian Prime Minister – they're both larger than life characters. I like him”, he said approvingly. Someone at the next table glared at him.

Lisa deftly changed the subject. She asked Miles about someone who they both worked with when Miles was an intern. He just started his own company in Sunnyvale. Ravi asked if Rick worked at this previous company too.

Lisa said, “No, he used to work at Apple. He was working on IoT (Internet of Things) devices. He was there for years. He ended up being a chief architect of their IoT products. Steve was somehow involved as an advisor of some sort. That's how they knew each other. Steve told me he thought the devices that Rick was working on were very cool and far ahead of anything available commercially. Anyway,

when Apple decided not to ship them, Rick quit and Steve hired him. From some of the stuff that Rick does, I'm pretty sure this is the first startup he's ever worked for. He keeps trying to do things the way they did it at Apple. Sometimes that's great and sometimes it doesn't work for a company of our size.

They continued to talk about people who they used to work with and where they were now. One guy had quit the tech business to start a brewery. Plenty of others moved around between the big tech companies in the local area.

Lisa asked Miles if he was still with the girlfriend that he had when they worked together before. Miles said "No, she went to Pittsburgh for grad school and I didn't want to follow. My parent's live in Alameda and I have other family in the area. Besides, all the best tech jobs are here. Neither of us wanted a long-distance relationship, so we split. "

Lisa said "Oh that's too bad. I liked her the one time I met her."

Miles said, "Yeah, she's great. We're still friends on social media, but she's got someone new and I'm over it. "

A few minutes after 5, Lisa got up and said she had to leave to catch the ferry to Marin County where she lived. As they continued drinking and talking, other developers drifted in and out of the conversation. At one point, Alex ordered a round of vodka shots for the table to drink a toast to the memory of Steve. Misha couldn't leave it at one toast and ordered another round of vodka. Miles avoided the vodka and kept with the beer.

Ravi asked Miles, "Is it true you found the body?"

Miles replied, "Yes, but I really don't want to talk about it."

Ravi persisted, "Who do you think killed him?"

Miles shrugged, "I don't know. They say that it's usually a family member, but I can't see how that's possible given the circumstances. "

Misha smirked, "I don't think Steve married Jennifer for her big brains."

Miles continued, "It had to be someone in the company, probably someone who worked closely with him."

Ravi said, "So, it's probably someone of the executive team. It had to be someone who he'd let into the cave. He's never invited me to come into the cave after hours."

Miles said, "No, the way the detective was questioning me makes me think that someone snuck in and surprised him. It had to be someone familiar with the lock and able to somehow break in."

Ravi said, "I know how I'd break in. I read a blog post about how to duplicate a key from a photograph. If I was the detective, I'd be searching for a homemade copy of the key. Personally, If I wanted to make a key, I'd use the CNC mill in the metal shop."

Misha scoffed, "So you think you'd be able to make a working key from just a photo? I don't believe it."

Ravi changed the topic, "But wait a minute, Miles, the cops questioned you? Do they think you did it?"

Miles looked out the window at the seagulls, took a sip of his beer and ignored the question.

The waitress came over to clear empty glasses off the table and chatted with Miles. Miles had been at that bar several times after work, but didn't remember this waitress. She remembered him and asked what he'd been up to. Ravi saw this and asked Miles, "Why don't you ask for her number. She likes you."

Miles smiled, "I don't know. She's cute enough, but I can never tell if a waitress is just being friendly or is really interested. Besides, she probably gets hit on all the time when she's working. I don't want to be that asshole."

Ravi said, "Whatever. If I were you, I'd make a move."

Miles let the subject drop.

As afternoon turned to evening, Miles decided to leave before it got too late and he got too wasted. It was grey, gloomy with some mist in the fog on the Embarcadero, but it felt good to be outside in the fresh air. He walked the mile or two towards the ballpark to his apartment.

Late afternoon, the office was deserted. The only people left were Anil and Rick. They both sat near Steve's office upstairs. Steve had one of three real offices in the building, not including the cave. He worked in his upstairs office during the working day. Sometimes he'd work down in his cave after hours, as he did on Monday night.

Someone had shut the door to his office and closed the venetian blinds in the sidelight as if to block out all reminders of his murder. Anil had a desk in the open area, as did Rick. Anil planned on moving into Steve's office, but not right away. He'd wait a few days.

Anil went over the financial spreadsheets and reviewed the cash flow projections. They were ok for month or so, but beyond that, it was looking grim. Changes would need to be made, and soon.

Rick was sitting in his open plan desk one row away from Anil. He walked over to talk to him. Rick asked, "Do you have time to discuss the financial projections now?" Anil replied, "Yes. Let's do it." He looked around. With the open plan office, he could see all the way to the back wall. There was no one else there and they could talk freely. Anil continued, "I was just looking at the cash flow burn rate. You're right of course. Changes need to be made. Steve was postponing the inevitable."

Rick had his own ideas but wanted to hear Anil's thoughts first. Rick asked, "What are you thinking? How deep do we need to cut?"

Anil answered coolly and analytically, "The makerspace staff is dead weight. I will keep the shop supervisor as a contractor but reduce his hours and right-size the rest". 'Right-size' was yet another business euphemism for firing. Anil continued, "For the time being, your team should be ok unless there is some dead wood you want to trim. I'll squeeze the sales team's comp plan a little and strictly enforce the expense account rules. That will cause some attrition there. "

Rick nodded, "My team is basically good, but there is one guy who might be a candidate for a layoff. I'll let you know next week."

Anil said "That will be fine. If we can get expenses under control, fundamentally, the company is as healthy as any startup can be. My goal is for the company to succeed to the point of taking this company public. That has been my goal and is even more so now that Steve's gone. From what you've told me previously, I believe this aligns with your personal ambitions as well. If we have to lose some people along the way to make it happen, then unfortunately, that's way the business works. The good news is if your team can pull off the product enhancements in the next deployment, we will be in good shape to cross the chasm and into hockey stick growth. "

This was apparently a hot button for Rick. He seethed, “Don’t you worry about my team. I’ll make it happen. You’re right, I am counting on getting this company to an IPO. Unlike you guys who cashed out from a previous startup, I’m in debt and still renting. You have credibility from being involved in a successful startup. All I have on my resume is a stint at Apple and a product that didn’t ship. I need this one to make my name and get some savings. I’ll do whatever it takes.” Rick had a few more questions about revenue recognition and how it affected the balance sheet. Anil answered them and then Rick went back to his desk.

9am Wednesday

The next morning at the office, it was pretty deserted. Most people were taking another day off or working from home. The software developers that decided to come in to the office were starting to trickle in as were the executives. The HR, sales, and other departments were sparsely attended.

The only physical reminder was the crime scene tape over the cave door. The police computer techs had removed the computer from the cave door and the monitor was dark.

Miles arrived after 9am, later than usual. The vodka shots from last night along with more than the beer left him feeling a little under the weather. At least he got a shower in today. He was there in plenty of time before the 10am scrum meeting.

Lisa was already there. She told Miles, “Rick wants to meet with us after your standup meeting. I think he wants to read us the riot act about meeting our schedule. He was not happy about the team taking the afternoon off yesterday.”

The daily standup meeting was quick. A total of 15 minutes where each team member told what they did the previous day and what they’re planning on doing today. In this case, it was telling about what they did the day before yesterday. They were making good progress, but it would be a challenge to finish their planned work before the end of the sprint on Friday. Miles said he’d finish his current story today and he thought he could get most of the way through the next one. It was Wednesday, and he had to, if they were going to finish by Friday morning. They had their end of sprint demo on Friday at noon and given the importance of this version, the VPs would all sit in.

When they were done, Miles went to Lisa’s desk and they went together to see Rick. While Rick had a regular open plan desk, like everyone else, he had commandeered a conference room for his own use. It couldn’t be reserved in the company calendar software like most of the other rooms, but occasionally people would hold impromptu meetings in it. A few months ago, Miles had seen the Dev Ops team face Rick’s wrath when he found them meeting there. The room was available and as Miles and Lisa were sitting down, Rick joined them. Miles wasn’t exactly nervous meeting with his boss and his boss’s boss, but he wasn’t exactly relaxed either.

Rick started, “This new deployment is going to save the company. The situation if we don’t succeed is dire. Tympani had been downplaying the risks and it’s time to set the record straight. If we don’t hit this

out of the park, the company will probably go under. I'm telling you this because you're both instrumental in making it happen. Lisa, you need to buckle down on all the scrum teams and do whatever it takes to increase velocity. It's crunch time. Miles, your piece of software is on the critical path. You yourself need to work harder and smarter. I don't care how you do it, just do it." Rick started calmly and got more intense as he spoke. He kind of reminded Miles of the actor James Woods.

Before he really knew what he was doing, Miles asked "What do you mean Tympani was downplaying the risks. I thought we were growing steadily?"

Rick said, "Don't be naive. We're growing, but the costs have been rising faster than revenue. Tympani insisted on scaling up sales ahead of what we needed. We're not making nearly enough to pay for sales team to fly at the drop of a hat and eat ribeye every night. And the makerspace? We should have shut that down months ago, but Steve blocked it. I like using the toys too but paying for the staff is a huge drag on the company. It pains me to say, but with Steve gone, we can finally make the sensible business decision. Anil wants this kept quiet until after the funeral, so don't tell anyone about the planned cuts. Don't be shocked if some of the non-essential expenses are cut. You're essential, for now, so you don't have anything to worry about. Keep pushing hard and get me results."

Miles absorbed this quietly. There was some truth to the rumors he heard. Lisa said, "Ok then. Is that all? Let's get back to work."

While Miles was in his scrum team meeting, Detective Martinez arrived at the front desk. The receptionist printed out a schedule of his meetings and led him to a conference room. "They've scheduled you an hour with each of the VPs, starting with Anil Patel". She pointed out the kitchen where the coffee was and the restrooms. "Their desks are all upstairs in case you need to find someone."

Anil arrived at the conference promptly at 9:30 am. He was wearing a white oxford shirt, jeans, and Italian loafers. Anil tried to dress casual, but it wasn't his nature.

"Are you making progress in your investigation?", he asked. Martinez lied that he was. He had investigated dozens of murders. All of them had been street crime having to do with gangs or a rare domestic. This was his first in a corporate environment. In the others, it was generally pretty easy to figure out who did it, how they did it and why. The challenge was always gathering enough evidence to convince the DA to prosecute. Here, the 'who' was any one of dozens of employees. He had no idea yet of the motive, though he would be surprised if it wasn't the usual - lust, greed, and/or vanity. But, he didn't think he'd even be able to understand the 'how' even after it was explained to him.

He fixed his eyes directly on Anil and asked, "Let's get this over with first. Where were you on Monday evening?". Martinez liked to prod potential suspects early in an interview to get a reaction. He was pretty sure that Anil wasn't in the building. Even in the crappy security video he could see him leaving the building at 5:40.

Anil met his gaze and answered calmly, "I was at home with my family in Burlingame at 26 Ancho St. I took Muni to the 6:15 Caltrain to Millbrae and had my 17-year-old son pick me up around 6:30. I was home with them for dinner and at 8:00 I went to my fencing club for an hour. "

Martinez had a digital recorder on the table, but also made a note in his paper notebook. "Fencing, huh?" Martinez asked. Anil answered, "Yes, I was serious about fencing at university and at one point tried out for the national team in the saber. Now I just do it for relaxation and exercise."

Martinez noted the alibi, he then asked, "What was Steve Tympani like and how was your working relationship?"

Anil answered that Tympani was a visionary leader but not necessarily a great businessman. He also said he had a good professional working relationship with him.

Martinez ask, "Not friends, huh? You've known each other a long time".

Anil answered in his proper English accent “One is never really friends with one’s superior.”

Martinez wondered if Anil was pulling his leg but moved on, “How is the company doing? Our forensic accountant will be looking through the books, but give me your thoughts.”

Anil answered, “I have no motive to obfuscate the truth. We will be shortly facing a cash crunch. Our costs exceed our revenue. It costs more to capture a customer than we make from them. This isn’t unusual for a startup, but we’ve grown our sales team too fast and we have too many other expenses. We need to cut costs. I plan on making changes as soon as I can.”

Martinez asked, “I’m no business expert, but this should have been obvious for some time. You must have talked to Tympani about it?”

Anil answered, “Of course we discussed the financial state of the company pretty much every day. I gave him my advice, but he was convinced that our new version would increase our revenue per customer by 10x or more. He thought we had time. He also refused to cut the makerspace staff that is just a drag on the rest of the business. In my view, it was self-indulgent to keep a fully staffed makerspace so you could do your own projects.”

Martinez then asked, “Did you ever think about going over Tympani’s head to the Board of Directors?”

Anil shuddered, “I’d never do something like that. I believe in following the rules and Steve was the boss. Unless I knew there was criminal activity, I’d follow his orders. Otherwise there is chaos.”

Detective Martinez thanked him for his time and told him he’d follow up later if anything else came up.

Martinez had a minute or two to himself to make a few notes about the conversation. While he was writing, Don Salmon stepped in. Don was the Sales VP who had been out of town during the time of the murder. Martinez chatted with him and found out that Don had worked with Tympani at their previous startup. Don told him that he wasn’t one of the early employees of the previous company and while he made some money in the IPO, he wasn’t a millionaire.

Don spoke with a New Zealand accent that had been softened by living in California for many years. When Martinez asked about the accent, Don told him he was originally from New Zealand and came over for graduate school. He was an ex-rugby player and played some in Berkeley while he was getting his master’s degree in Computer Science.

Don told him that Sharon called him when he was in Boston and he cancelled his customer meetings and immediately flew back. When he got back late afternoon, he talked with Anil and was up to speed.

Martinez didn't think that Don was directly involved in the murder since he hadn't been there. He'd have to check his alibi, but it seemed solid. Martinez started by asking Don for his flight number and which hotel he'd been staying at in Boston. Don told him.

Martinez asked, "Have you ever had any conflicts with Steve Tympani?"

Don chuckled affably, "Besides the time we had a fistfight in Boulevard?" Boulevard was a fancy restaurant not far from their office. "This was years ago, but we had a goodbye dinner for one of the guys who was leaving the company. We both had been drinking and I punched him. He turned over the table and they threw us out. The guy we were giving the dinner for had to pay for the damages. I've been banned from there for life", he said with a wry smile. Don continued, "Seriously, I thought he was doing a great job. He was a true visionary. I will miss him."

Martinez changed tactics, "Can you think of any reason someone would kill him?"

Don said, "I can't imagine. Oh, as CEO, he certainly might have enemies, but not enough to kill over."

Martinez asked him to explain enemies.

Don said "As a manager, you have to make tough decisions all the time. Some of them will be unpopular enough to make someone hate you. For example, out our last company there was a VP who had an affair with a much younger engineer. The engineer said she was coerced, and the scandal threatened to derail the company IPO. The CEO did the usual thing - reassigned the exec to a new post with no direct reports, with the understanding he'd promptly find a new job and resign. Steve had been appalled. When he started this company, he made sure it was known that he'd summarily fire anyone abusing their position. If one of the guys here was caught with his pants down, they'd certainly consider Steve to be an enemy."

This was the kind of thing that Martinez could understand. He thanked Don for his time and dismissed him.

As he was talking with Don, Martinez's computer tech guy showed up. He could see Martinez through the glass walls of the conference room and walked in as Don left. Martinez said, "Let's get the IT guy down here to help us go through the card key log". Martinez stepped outside and chatted with the

receptionist. He came back. "The IT guy is a chick. She said we'd want Anna Franklin. She'll be here in a minute."

Anna came into the conference room and said hello. She was a tall, African American woman with long braids. While she was introduced, she sat down with her laptop and started typing. "Sorry, but I've been instructed to let Joel know if I talk to you.". A minute passed as she typed. "Ok. what can I do for you?", she said brightly.

Martinez said, "Before we get started on the main topic, I want to ask you about the possibility of getting video from the cave door thingamajig."

Anna answered, "I wrote some of that code and helped install it. The computer in the door doesn't have nearly the storage to record HD video. And it barely has enough horsepower to run the displays. You might be able to dig out the last few frames of video from its memory, maybe. It would show me shutting it down to hand over to you."

The police tech asked, "No cloud storage either?"

Anna answered, "Cloud storage would have been the way to go, but Steve didn't want any stored video and we would have had to use a more powerful computer. Like I said, you might be able to get the last quarter of a second from memory, but not more."

Martinez said, "This is routine. I need to ask everyone involved, but where were you on Monday night?"

Anna replied, "Hmm. Monday night. I was at home from 7pm until about 2am playing video games. I play a multiplayer co-op game".

Martinez asked, "Can anyone verify this?"

Anna laughed, "I stream on Twitch. There's 7 hours of video time stamped video of me playing that night. Knock yourself out".

Martinez was puzzled why a young and attractive woman was sitting home alone and apparently happy about it.

Martinez said, "I keep hearing some odd terms that don't seem to mean what I think they mean. Could you help me out? What is this 'scrum' and 'sprint' that you guys are always talking about?"

Anna smiled, "I not really the right person to ask about our development process, but I can give you the gist of it. We break our programmers into teams of 6 or so people called scrum teams. Pretty much all companies use that terminology, but I don't know why. The scrum teams work on a two week schedule, called a sprint. They break the work into pieces called user stories that they can finish in less than two weeks. At the end of the two week sprint, they do a demo. It's supposed to be faster and be more predictable to do it this way, but I don't know if it works. The IT group that I'm in doesn't work that way, only the software developers. Though, sometimes the HR team talks like they're using scrum, but nah."

Martinez said, "Thanks. That helps. Ok, the real reason we need you is to go over the card key information. We are puzzled by the cardkey logs and hoped you could help us".

Anna said "Ok. We have a cardkey system that logs entries and exits from the front door, and exits only from the side door. We discourage people from letting others in via the side door and from tailgating in or out, but it does happen. "

Martinez asked, "You mean one person uses the card key and two people enter, is that right?".

Anna agreed and continued, "I've been told that you have the logs from Monday night, what's the trouble?"

The police computer tech answered, "The logs must be incorrect. They show Tympani leaving at 6:24pm and he didn't return. I checked against the front door security video and he didn't leave then. I checked Miles Fletcher too. It shows that he left at 5:57 but we know he never left. I suspect someone swapped the logs out with the logs for a different day."

Anna said "You think the killer covered his tracks? Let me take a look at the logs on the system." Anna opened her laptop. The lid was covered in EFF and Defcon stickers. She told them that the cardkey system was controlled by the HR department and linked into the IT systems. It was set up so that HR could add new people or revoke access when someone left the company without IT doing anything. The logs would be easily accessible by the HR people but in theory locked out to anyone else.

She showed the police tech on her screen, "Here are the logs, they appear fine. A new file is created each day at midnight. It's odd though for Monday, see, the file creation timestamp isn't Monday at 12:01am but at Tuesday at 12:01. It's like someone replaced the file immediately after it was closed. The new file is owned by the process that runs the card key logs, just like it should, so I can't pin it on anyone directly."

They both sat and thought for a minute. Martinez was looking at something on his phone. He had no patience for computers.

Anna piped up, "Let's check the crontab file, I bet the culprit wrote a script to change the file. The timing is too good for a person. " Crontab is a way of scheduling programs to run at a particular time on Unix systems. She meant it would be hard for a person to get the timing just right to replace a file one minute after midnight, but it would be easy to do it with a scheduled script. They looked at the crontab file and saw a bunch of backup and maintenance scripts running at midnight. Anna was able to identify these as normal. There was one that she didn't recognize that fit the criteria. It was using the user credentials for greent.

The tech said "That's the one, Who's username is greent?".

Anna said it would be Tim Green, the HR manager under Sharon Dowling.

The police tech said, "Let's have a chat with Green and ask him what he's up to".

This got Detective Martinez's attention. He said, "You found something, explain it to me". They did, and Martinez started taking photos of the laptop screen. Anna chuckled and told him he didn't need to do that, she'd send him screenshots of everything they did. Ann wrote up a brief report of her meeting with the police and sent it along with the screenshots to Joel DeAngelo.

Martinez took out his phone and called the lawyer. Joel hadn't had a chance to read Anna's email yet so he didn't know what was going on. Martinez told him they found evidence that Tim Green was involved in the crime and were going to take him to the station for questioning. He asked if Green was in the office and to bring him down to the receptionist. Martinez told Joel he wanted as little of a disturbance in the office as possible. He also told him to postpone further interviews until he had a chance to interrogate Green. Joel asked if he was going to charge Green. Martinez said he wanted to talk first. He thought he had enough evidence for obstruction but not yet for murder.

While Joel went to retrieve Green, Martinez made some phone calls. His first call was to his researcher who did leg work for him. He told her that he needed cell site location information (CSLI) for Green for Monday at noon until Tuesday at noon. While she was at it, she might as well get it for Anil, Sharon, Rick, Don, Joel and Miles. He said he'd text her the numbers when they got off the call. He could get CSLI information that gives the rough location of a cell phone without a warrant. It would tell which cell sites a phone connected to, but not GPS location. He could get GPS location, but he'd need probable cause for that. If he got enough to arrest Green, he'd get a warrant for the GPS location.

Joel found Tim in the kitchen making a sandwich. Joel said, “Tim, eat fast, the police want to bring you in for questioning.”

Tim, normally self-assured, fumbled and dropped the butter knife he was using to spread mayo on the bread. He said, “What do they want to talk to me about? I didn’t have anything to do with the murder”. He looked pale, grimaced and tossed the sandwich parts in the compost bin.

Joel said, “All I know is that they want to talk to you immediately. I advise you to ask for a lawyer even if they say you don’t need one. Although I am the corporate attorney, I can help unless they arrest you for a crime. Then you’ll need your own criminal attorney. Remember that I represent the company and when our interests diverge, you’re on your own. But, let’s find out what they have first.”

They went down to the reception area. Detective Martinez told Tim that he was taking him to Central Station for questioning in the murder of Stephen Tympani. He wasn’t being arrested at this time.

Joel told Martinez that he was acting as Tim’s attorney for the moment and would accompany him. Joel told Martinez that there was no need for a squad car, he would take Tim to the station himself. Martinez reluctantly agreed and called the station and cancelled the squad car.

By this time the word had spread throughout the company. Miles heard about it while he was microwaving a frozen burrito in the kitchen. Sometimes they had catered food in the kitchen, but apparently not today. He made do.

He was making good progress on the last user story for this sprint. They still had a lot of work to do before deploying the software, but he could see the light at the end of the tunnel. Based on Rick’s rant earlier, Miles worried that if they didn’t nail the sprint demo, his head would be on the chopping block when layoffs happened. While eating his burrito in the lunch area he saw Brandy O’Shaughnessy talking to Sharon Dowling. Brandy was clearly upset at the news. It was startling for sure, but Miles was surprised how much it affected her.

Selfishly, Miles felt somewhat relieved. If the cops think Tim did it, then maybe they wouldn’t come after him. Even so, he was pretty sure Tim wasn’t the murderer. Tim was a pretty boy surfer from San Diego. He must be smart enough to get a job here, though. Even HR folks needed enough technical knowhow to communicate with the geeks. However, given that Tim was in HR, he didn’t think Tim had the technical ability to hack the door. Also, he had never seen him use any of the makerspace tools.

Miles stuck his dirty plate in the dishwasher and got back to work.

1:30pm Wed SFPD Central Station

The dingy interview room still smelled like cigarette smoke, even though smoking had been banned inside city offices for more than a decade. Tim sat opposite Detective Martinez with Joel at Tim's side. The interview room was wired for sound and video, but Martinez turned on his digital recorder and put it on the table. It was mostly for show. Sometimes he could trip up a subject by turning off the recorder and telling him to go off the record. Not likely to happen this time with a lawyer in the room.

Martinez went through the usual preliminaries, asking for names and addresses, saying that Tim wasn't under arrest, and so on. He then told Tim that if necessary he'd have his computer tech come in to help with anything computer related, but he wanted to get started without him.

Martinez then asked, "How did you get the cave door opened? Did you have an accomplice?"

Tim, who typically exuded confidence, was fidgeting in the hard plastic chair. "I didn't open the door. Heck, I don't know how to open the door. "

Martinez said, "But you don't deny being in the office on Monday evening."

Tim sputtered. "Heck yeah I deny it. I wasn't there."

Martinez then asked, "Ok, let's do this step by step. What time did you leave the office?"

Tim hesitated for a fraction of a second and said, "I left around 5:30"

Martinez said, "If that's the case, why'd you change the card key records? We know you set it up to erase the day's records. Why'd you monkey with the logs if you weren't trying to hide your exit. Unless you were there when Tympani was killed. Let me understand that part."

Tim reluctantly admitted, "Yes, I did set up the script to change the logs but I didn't kill Steve. I had no reason to kill him and I don't know how to get into his cave without his key."

Martinez pushed, "Let's say I believe you about killing Tympani. Make me understand why you'd risk your job to alter the logs".

Tim brashly stated, "I was doing something that would cause me to lose my job if I had been caught. Pardon me if I don't admit to it with the company lawyer in the room. I wrote the script to swap out the logs with last Monday's figuring no one would check. If they did, they'd see that I was there until after 5. I really left around 3:30. "

Martinez said, "I have your cell phone records. They show that you were in the vicinity of the office at 9pm. How do you explain that?"

Tim stammered, "I ca can't. I wasn't there at 9pm. I left the office around 3:30, took BART to Oakland and was there until 6:15 and then took BART back to Civic Center and then Muni to my house. By 9pm I was at home"

Martinez then asked, "I understand wanting to protect your job, but you know I could indict you right now on obstruction of justice. I need more details, otherwise I'm going to arrest you and hold you for 48 hours until your arraignment."

Tim looked at Joel, then back to Martinez and said, "All I'm willing to say is that I left the office early to meet with a woman. If my wife finds out, she'll probably divorce me. If I admit the details, the company will fire me. I'll take my chances with you. You're a man, haven't you ever wanted a little on the side?"

Martinez said, "Fine then. I'll arrest you, DeAngelo here leaves, and then you can tell me all about your afternoon delight". Martinez got up to leave. He said he had to do some paperwork, but would be back in a while. He told the uniformed officer in the hallway that Joel DeAngelo was free to leave but Tim was not.

When they were alone Joel said, "When he arrests you, you will need a lawyer, no matter what he tells you. Do you want me to arrange one? You'll have to pay for it, but trust me, it will be worth it."

Tim agreed.

Joel continued, "You know, just altering the log is a firing offense. You should come clean on the whole thing. Your wife probably already suspects too."

Tim replied curtly, "I'll handle my wife, thank you. If I'm going to be fired so be it. Logically, there's no benefit telling you". Left unsaid was that the affair was only a firing offense if his lover was a fellow employee. Not that it would be too hard for Joel to figure out who it might be.

Joel left Tim to await his fate and went back to the office. As he promised, he called a criminal defense attorney that he knew by reputation and asked him to take Tim's case.

Detective Martinez started doing the paperwork to arrest Tim. His cell phone buzzed. It was the researcher getting back to him with the cell phone records. Martinez called the researcher. "Just give me a summary and email me the details.", he told her.

She said, "Green's cell phone was connected to the 101 California St tower until 3:41 pm when it dropped off. It reconnected to the Union Pacific tower in Oakland at 3:56 and then to the Western States tower on Grand in Oakland at 4:02. It stayed connected there until 6:19. Then it went back to the UP tower and finally to Sutro Tower in SF at 6:53. It stayed there until around just before 9am Tuesday when it connected back to 101 California. "

Martinez thanked her. So, Green was telling the truth, at least some of it. He still liked Green for the murder. There was nothing that proved he didn't leave his phone at home and go back to the office and kill Tympani. He had opportunity and motive. Maybe he had his girlfriend get Tympani to open the door, then he went in and killed him while she held the door open. That would fit. He'd let Green marinate overnight and see if he could pry some details out of him. He let Green sit for a while and then visit with his new lawyer. The lawyer demanded that Green be let go if he wasn't going to be arrested, so Martinez arrested and booked him. It was too late for him to be arraigned that day, so he was scheduled for the following morning.

Back at the office, Miles and the rest of the scrum team was busy working. They tried to ignore the rumors flying around on the Slack channels. The rumor mill had heard, correctly, that Tim Green was being arrested. Some people had the correct information that he was being charged with obstruction, not murder, but speculation was rampant. Shortly after 5pm, Miles decided he needed to get out of there. He could get a walk in, get home, eat something and then get back at it after dinner. All he needed was his laptop anyway. He packed up his bag and headed out.

As it turned out, Brandy was leaving the office at the same time. They walked together towards the Embarcadero station. Miles walked or skateboarded all the way to his apartment on most days. Given his late hours and he was carrying a heavy laptop, he had decided to only walk as far as the Embarcadero station today and take Muni the rest of the way. They commiserated about the difficult few days.

Brandy asked Miles if he could keep a secret. Miles of course said yes. She told him that it has been especially tough for her that Tim was arrested. She confided in him that she had been seeing Tim. Miles was surprised because he thought Tim was married. Brandy said, "Yes, I know I shouldn't. He's married and he's my boss. But we had this incredible chemistry. The company policy against dating within a department is such shit. We're all adults, we should be able to decide for ourselves. "

Miles asked if she knew what was going on with the obstruction charge. Brandy said, "Tim knew that if Steve found out about us, he'd fire both of us. Since Tim had access to the HR systems, he covered our tracks, so we could sneak out early on Mondays. It's hard for us to find time together since he goes home to his wife." Miles asked, "It was a coincidence that the murder happened at the same time?". Brandy was emphatic, "Yes. He had it set up to swap out the logs before we left on Monday afternoon. Tim may have hated Steve for his fucking medieval and paternalistic dating policy, but I swear we didn't have anything to do with murder."

As they approached the BART/MUNI station, they compared commutes. Miles took Muni to his condo near the baseball park. Brandy lived in an apartment near 19th ST BART in Oakland. Brandy said, "It's a brand-new complex with all kinds of cool technology. There was an article on Gizmodo about it a couple of months ago. The doorbell has a camera with facial recognition. It can text my phone when someone goes to the door and unlock itself automatically when I arrive. I can control the thermostat via an app on my phone too. It's supposed to learn based on how I use it, but sometimes I think it's just screwing with me. That or some hacker got into it." She gave a joking smile when she mentioned the hacker. They were almost at the station and about to go their separate ways when Brandy said, "Why don't we get a drink sometime." She put her hand on his upper arm, "When this is all over." Miles said

he'd like that. They swapped phone numbers and she waved goodbye and took the escalator down to the BART tracks.

While Miles and Brandy were walking, Anil was still in his office working. Don stuck his head in the doorway and knocked. "Hey, do you have a minute?"

Anil invited him in. Don shut the door and sat down and said, "Between you, me, and the gatepost, I had dinner with a mate who runs a private equity firm on Monday night in Boston. I've been keeping this in my back pocket, but I've been having discussions with him on and off about making an investment here. They are interested in acquiring a significant stake but they want seats on the board. I know Steve wouldn't have heard of it, but that's water under the bridge. As you know, he was adamant about keeping control. Too many startup founders end up getting kicked out by private equity investors. Anyway, I thought it was a door worth opening just in case. If we got into a serious trouble, we'd have options."

Anil was thoughtful. "It's something to consider now that Steve's no longer CEO. We'll have to talk to Steve's wife after the funeral. She controls his shares through community property or will soon. I imagine she'd be open to reducing her share of the company for cash. We might also need to dilute some of the minor shareholders, like Rick and Sharon. "

Anil continued, "All of this depends, of course, of the valuation and how the deal was structured. Give me your contacts info and I'll see what he has in mind."

Don said, "Be sure to do it quietly. We need these guys to perform. Rick can be volatile and there's no telling what he'd do if he thought he was being screwed out of his equity."

Miles got home and prepared some dinner. He lived alone in a one-bedroom apartment. Even though he lived alone, he still liked to cook a proper meal for himself at least once a week. He had bought a pork chop at the butcher shop in the Ferry Building on Saturday. He thought he better cook it now or it might go bad.

It would take a while to cook and he could work in the meantime. He took the double thick, bone in chop out of the fridge. He mixed up a little dry rub – salt, brown sugar, crushed rosemary, onion and garlic powder, cayenne pepper, and smoked paprika – and put it on the meat. He put the flavored meat in a ziplock bag and into his sou vide cooker and set it at 140 degrees. It would take at least an hour to cook, but if he got distracted it would still be good in two or three. He planned on making rice and a simple pan sauce from the drippings. It would be tasty. He kind of wished he had bought some green veg to go with it but hadn't. The greens always went bad before he got around to eating them. He opened a bottle of Pliny the Elder IPA and got back to work.

It helped to have a change of scenery. He was able to make some progress on his user story. Next thing he knew, it was two hours later, and he was starting to get very hungry. He started the rice cooking and went back to work for another 15 minutes while it cooked. The rice wasn't done yet, but he could take out the porkchop, finish it, and make the sauce while it finished cooking. There was a lot of juice in the sou vide bag that would make a great base for the sauce.

First, he browned the chop in some butter and put it in the warming drawer. He wanted to keep it warm while he made the sauce. He melted a little more butter in the skillet and poured the juices in. He added a little flour into the pan to thicken the sauce. It wasn't the best way to do it, but he was lazy and hungry. He didn't care if it turned out a little lumpy. He tasted the sauce. It was good. There was enough salt in the dry rub that he didn't need to add more. He heated the sauce and kept stirring until it was just boiling and started to thicken. The rice was ready now. He got the pork chop out of the warmer, dished out some rice and added his sauce. Not bad. Another IPA and he was good to go.

When he was done, he put the dishes in the dishwasher, and got back to debugging. He finally gave up working around midnight and went to bed. He was happy he wasn't Tim Green, spending the night in jail. And, he wondered just how much trouble Brandy would get him in.

9am Thursday. SF Police Jail

Tim Green didn't get much sleep. It was loud, smelly, and worst of all, there was a fluorescent light burning outside his cell all night. Someone told him that he would be arraigned at the courthouse near city hall sometime that morning. At little after 9 am, he was brought to another interview room, similar to the one he had spent so much time in the previous afternoon. Shortly after Tim sat down, Detective Martinez opened the door and walked in. Martinez told him that his cell records were consistent with his story. Martinez implied that Tim was cleared on the murder charge. If Tim would fill in the details of who he was meeting in Oakland, Martinez would drop the obstruction charge. A night in jail was scary, but it didn't make Tim stupid. He said he wouldn't admit to anything without his lawyer. Martinez pushed, "I can hold you here for 48 hours you know. If you just tell me, you'll be free to go, and I'll make the arrest record disappear. Do you want to explain to your next employer why you were arrested for obstruction?". Tim wouldn't budge. "Get me my attorney and we'll talk".

Martinez went away and a little while later uniformed cop came by and told him, "You're free to go. Your attorney is outside". Tim was relieved to be out of there. In the jail lobby, the attorney explained that the District Attorney declined to press charges on just obstruction. The lawyer said, "Martinez is full of crap. I've dealt with him before. He still likes you for the murder, but can't prove it. He was using the obstruction charge as leverage. The DA just took away that leverage. If Martinez thinks he can prove murder, then they'll charge you on both murder and obstruction. If he hassles you again, call my cell number." Tim went home to get some sleep and figure out what the heck he was going to tell his wife.

Martinez was annoyed that he couldn't immediately pin the murder on Green. It would've been the easiest way to clear this case. There was always Miles Fletcher or maybe one of the other executives. He looked at his notebook. He still needed to interview Rick Clements, Sharon Dowling, and Fletcher. And, he wanted to know who Green's lover was. Maybe it was Dowling. She'd certainly know who it was, or at least could make a good guess.

He then thought he should get a wiretap on Green's phones. If he got Green's lover and pressured her, she'd likely call him. He could use whatever they said against one or the other or both. He did the busywork to get a wiretap on all of Green's phones.

He next reviewed the cell phone records that he requested the day before. Patel's confirmed he left when he said. It didn't prove anything conclusively. Like Green, he could have left his phone at home and came back and killed him.

Dowling's records showed that she left the office at 6:15 or so on Monday and she went to somewhere in South City or Daly City. He looked up her address from her phone number and found, yep, Daly City. She, or at least the phone, stayed there until she returned to the office early Tuesday morning.

Martinez included Joel DeAngelo's data in the search to be thorough. He didn't expect to find anything. It showed he left the office after 6 and connected to the Twin Peaks tower when he arrived at his house in the Castro.

Likewise, Martinez included Don Salmon's phone in the list for completeness. He expected that it would show he was in Boston as he said. The funny thing is, it didn't show up at all until just before noon on Tuesday at SFO. Maybe it was nothing, but it might be worth looking following up on.

The last person on the list was Rick Clements. Clements' CSLI was more interesting. His phone dropped off the downtown SF site at 7pm and reappeared on the Twin Peaks site at 9:45 pm. His phone record showed an apartment on 24th St. The gap could be interesting. It was right smack in the middle of when the murder happened. But it also would be consistent with his battery running out. It was interesting but didn't prove anything. He would get some lunch and then go back to the Tympani Industries office and talk to Dowling and Clements.

On Thursday morning, Miles got in at his usual time. He had made good progress the night before and had checked in the code for his last user story. He'd spend the day making sure his code worked with the rest of the scrum teams recent code. He had run a simple smoke test on his development laptop before checking in, but would need to do some more testing on live on the dev and test servers. Undoubtedly, he would need to fix some bugs before it was ready for the demo on Friday. It had to work flawlessly on Friday. He was worried Rick would put him on the layoff chopping block if there was even a minor problem. That, and if they didn't get it released on time the company might fold anyway. It was super important that it all work great.

At some point during the morning, while he was testing, Brandy's perfume wafted through the room. He looked up and she smiled at him. Distracted, his mind wandered back to the laser cutter, the paper key, and the c@rd1c3.DXF file. If it was written in hacker 'leet' spelling it would be cardice. That sounded like a place name. He punched it into Google Maps and the only result was a street name near Melbourne, Australia. So, no. He put into Google itself. Interestingly, it's a British term for dry ice. He had never heard of that before. Miles closed the Google tab in his browser and got back to work.

Early in the afternoon, Martinez arrived back at the Tympani office and commandeered a conference room, kicking out the occupants who were having a one on one meeting. He called Rick Clements' cell phone and asked him to come to his meeting room so they can have a chat. Rick said he'd be there in a minute.

Ten minutes later, when Rick hadn't arrived, Martinez asked the receptionist to call him. She sent him a slack message and told Martinez that the CTO would be right down. Martinez was about to go find him himself when Rick hurried into the conference room, "I don't have time for this bullshit today, so let's make it fast".

Martinez ignored his comment and gave him a friendly smile, "This will be quick. I'm not a technical person, so I won't ask about what you do. I want to know about your background and your relationship with the victim".

Rick said "I have a bachelors in linguistics from a small liberal arts college that you've never heard of. I went to Stanford for a master's in computer science and have the student loans to prove it. After I graduated, I worked at Apple and ended up managing an IoT project that was really cool, but never shipped. I met Steve when he was beta testing my devices in the Mission District Victorian he was living in and renovating."

Martinez pretended to understand what he meant by IoT and beta testing.

Rick continued, "When it was clear my project at Apple wasn't going anywhere, Steve asked me to join this company."

Martinez did pick up on the student loan mention, "You still have student loans? I thought all of you tech guys were making big bucks." Rick said, "I do ok, but child support payments to my ex-wife and the rents around here leave me drinking beer and not Lagavulin single malt."

Martinez then got to the meat of his questions. He asked "When did you leave the office on Monday night?" Rick smoothly answered that he'd went home around 7. That part agreed with the cell phone data, but there was still a gap to contend with. It was smooth enough that Martinez thought it might have been rehearsed.

Martinez remembered that Miles Fletcher had mentioned that Clements had been there late. "Are you sure of the time, it wasn't later?", Martinez asked.

Rick answered, "I couldn't swear what time it was. It was around 7. I got on my motorcycle and went straight home and ate dinner".

Martinez followed up, "Can anyone confirm this? We're checking everyone's whereabouts. It's routine for a murder case." Rick said he the office was almost deserted at the point and he didn't walk out with anyone. He didn't have anyone and couldn't think of anything to confirm his location.

Martinez said, "If you think of something let me know." He then asked if Rick if Tympani had enemies and who he thought killed him.

Rick said curtly, "I don't know anything about why someone killed him or who they are. Unless you have real questions I can answer, I need to go. I've got a lot to do today, especially with Steve gone. Slack me if you have more questions." And then he got up and left.

Martinez didn't know what Rick meant by slack, but got the gist of it. He thought about dragging the arrogant jerk downtown and put more pressure on him, but he held back for now. He felt Clements was not telling the whole truth but didn't know what he was holding back.

Martinez then called Sharon Dowling and asked her to come down. She showed up promptly. Unlike Clements, she was wearing a serious dark blue wool dress and low pumps, not jeans and running shoes.

Martinez said, "I want to talk to you about Tim Green. He worked for you, right?" Sharon said yes, he did, but if they were going to talk about him, she wanted Joel DeAngelo in the room. She was not going to fool around talking with a detective about an employee without the corporate lawyer present.

Martinez agreed to wait for him and Sharon phoned Joel to join them. Martinez said, "While we're waiting, can you confirm your whereabouts on Monday night?"

She told him what he already knew from the cell site data. Joel came down the stairs to the conference room a few minutes later.

Martinez said "We know that Green was having an affair with someone in this office. He admitted swapping out the card key logs to cover it up. He was worried about getting fired because of it. He won't tell who he was seeing. What's your policy about dating in the office?"

Sharon explained that they strongly discouraged dating between people in the same department and forbid it between boss and subordinate.

Martinez asked, "Who worked for Green?"

Sharon said that he had four direct reports. Two women and two men.

"Well, the men are out. He said he was meeting a woman.", Martinez said.

Sharon said, "One of the women who works for him is a recruiter who works out of her house in North Carolina. She's out too. That leaves only Brandy O'Shaughnessy. "

Martinez said, "No, there is another. You".

Sharon blushed slightly. "No, it wasn't me. I can prove I was here after 5. Sigh, he's good at his job, but this puts the company at risk. Brandy is good too. Steve would have fired both of them on the spot, but with him gone, I'll see what I might be able to do to save her job. I will let Tim go myself. I don't want to see him in the office again. I'll take care of it."

Martinez was happy, he had what he needed. He had new leverage to use against Tim Green. He would get O'Shaughnessy to rat out Green.

Martinez asked Sharon to go get Brandy, so he could talk to her. He'd have a friendly chat with her here and if necessary arrest her and bring her to the station for further questioning. Joel decided to stay and listen, just in case there was any company liability. Brandy had already heard through the office grapevine that this meeting was happening. She knew she was about to be questioned and emotionally prepared herself for it. Or so she thought. Sharon brought her to the conference room and then went back upstairs.

Martinez said to Brandy with no preamble, "Let me tell you how I think you and Green killed Tympani. You and Green went to your place in Oakland to do the wild thing. I assume you live in Oakland, maybe it was a motel. Doesn't matter. You and Green decided you needed to kill Tympani because he suspected the affair. You arranged to meet Green back at the office around 9pm. You both left your cell phones at home, so you'd have some kind of alibi. You didn't worry about the card key log since Green already covered your tracks. Green would have known where the blind spot is in the front door security camera, so you were able to evade that too. Once inside, Green got welding gloves, a welding apron, and the foam cutter from the makerspace. He hacked the computer and opened the door. You held it open and held down the latch, so the propped open alarm wouldn't go off and Tim could get out. Tim killed Tympani with foam cutter, left it and the bloody welding glove inside and then left. How am I doing?"

Brandy glared at him, “Your theory is bullshit. Yes, Tim came over to my apartment in Oakland and left after an hour. The rest is crap. I didn’t go back to San Francisco Monday night. I certainly didn’t help Tim kill anyone.”

Martinez said, “You know I can arrest you right now for obstruction and then while you’re in custody piece together an accessory to murder charge and have enough to make it stick. Why don’t you help me understand why you did it and I can talk to the DA about a lesser charge?”

Brandy looked at the corporate lawyer. Joel got up and started walking out, “This is between you and the police now. It’s not a corporate matter. I can’t help you with it. Take some advice though, get a criminal attorney before you say anything.”

Brandy said, “Thanks Joel” and to Martinez, “I have nothing more to say. If you want more from me, arrest me and I’ll get an attorney. “

Martinez said “Suit yourself. You know you’re going to lose your job over this no matter how it turns out. Think about how much harder it will be to find a new one if you’ve just been arrested for murder. If you tell me what I need to know about Green, I promise you won’t have to do any jail time. At worst the DA will give you probation. Think about it. I’ll give you 24 hours to talk to me. After that, I’ll give Green the same offer and see who saves their ass first.” Martinez was allowed to lie and took full advantage. Any deal he made wasn’t binding on the DA, besides he would deny he ever made it. Brandy walked out of the room without saying another word.

That afternoon, Miles was testing and debugging his work. After he checked it in, it was integrated into the product as a whole. His code, when running on his laptop, ran perfectly. When it was deployed along with the rest of the software on the development server, passed the initial automated test. The testing guys ran more comprehensive load and performance automated tests and reported random failures in his code. These types of problems are both typical and difficult to resolve. Miles chatted with the testing people on the Slack channel as he tried to isolate the problem. It probably would work well enough for the sprint demo, but with the audience of VPs, Miles wanted it to work flawlessly. Rick apparently had been monitoring the Slack channel as well and asked him to come to his office to give him an update. Miles said he would, but he needed half an hour to review the latest testing results first. Rick told him to do it faster.

After leaving Brandy and Martinez, Joel walked upstairs to his office. As he did, he walked past Rick at his desk and stopped at Anil's. Joel said to Anil, "Martinez thinks Tim killed Steve with Brandy's help. Let me rephrase that. Martinez is trying to pin Steve's murder on Tim and Brandy. Who knows what Martinez actually thinks. He's trying to get one of them to flip on the other. I don't think there is any corporate liability, but it bears watching." Anil had some more questions and Joel suggested they go to his office where there was more privacy. Joel's comments went through the office grapevine within milliseconds.

The killer heard about Brandy and Tim too. Here was the key him getting away with it. If she was removed from the picture, the damn cop would pin it on someone else. He'd be in the clear. As it was, Martinez was getting too close to the truth, though the cop still didn't have a clue how he'd opened the door. He decided on the spot to make it happen. He knew just how to do it too.

He fired up TOR, the anonymous web browser and connected to Shodan. Shodan is a special search engine for finding Internet of Things (IoT) devices like the networked control system in Brandy's apartment. He had already looked through the company's HR systems to find her street address. The killer found the apartment building's network and her specific devices. He recognized the doorbell/cam device and the heater/air conditioner. She also had a smart vacuum, refrigerator, and washing machine. He could screw with her by having her washing machine reorder 10 buckets of laundry detergent from Amazon, but he passed - he had a more deadly task.

Instead he concentrated on two devices. First, the heater. It was a gas heater with an automatic piezoelectric starter, rather than a traditional pilot light. It was like the starters on modern gas stoves that click and spark until the gas starts. In this case the furnace put out a small amount of gas next to the sparking starter and once that lit, it used that to start the main gas flow. There were thermostats and

interlocks to prevent the gas from flowing when it wasn't lit. The killer saw that he could hack the smart heater to override the interlocks and flood the apartment with gas. He could touch off the gas with a spark from the piezo starter. It would turn her apartment into a bomb.

Next, he worked on the doorbell. He planned on using it to trigger the bomb. He needed a way to know she was home. The camera on the doorbell was really helpful. It had facial recognition and would automatically unlock when it saw her. There was a way to have it perform other actions when it recognized her, like text someone. There was a site that home automation fans often used for linking multiple devices called If This Then That. He'd use that to trigger the bomb 30 seconds after the door unlocked. That would give her the chance to open the door and walk in the room, but not enough time to react to the smell of gas. He set it up to start the gas at 5:30. If she left right at 5, it would have 10 minutes or so to flood the apartment. If she happened to leave much earlier or later, He'd log back in and change it. It was all set now and waiting for her to come home that evening. He closed his anonymous browser and got back to work.

Martinez wasn't sure what to do next, so he went up to the lunch area to get some coffee. The office had some kind of robotic espresso machine. Martinez had to get one of the guys there help him. He told them, "I don't want anything fancy, just a cup of black coffee, ok?". There were some stools next to the counter near the coffee machine. He sat down, drank his coffee and thought about what he would do next. He would let Brandy sweat and wait and see what the wiretap uncovered. Brandy would certainly call Tim. Maybe she'd say something that he could use against one of them. He frankly didn't care which one.

He thought about his other potential suspects.

Patel had the best motive. He immediately benefited by becoming the CEO. He admitted that the company was in trouble and he was going to save it. So he had a financial motive too. His fencing skills would make him a natural for killing with a blade. The DA would like that. On the negative side, his cell phone movements supported his alibi and he didn't think the finance guy would be able to open the locked door.

Clements also had a decent motive. He must have known the company was in trouble and his personal finances weren't great. If Tympani ran the company into the ground, it would hurt Clements in a big way. He'd lose his job and whatever equity he had in the business. In terms of alibi, Fletcher had said he saw Clements' jacket there late, which contradicted Clements' story of leaving at 7pm. The cell phone records were inconclusive. As CTO, Clements certainly had the technical skills to hack the door. And, how could he have known which bottle of scotch Tympani was drinking that evening unless he was there? On the other hand, if he had been there late and killed Tympani, he would have had to get around the card key log. He must have known the logs would show that he was still in the building. He had no way of knowing that Green had messed with them.

Fletcher was different. He couldn't figure out what his motive would be. Or, more precisely, what motive he'd attribute to Fletcher when he talked to the DA. These techies, especially the millennials, were odd. Who knew why they did half the crap they did. What he did have on Fletcher was opportunity. He was there in the building that night. He found the body. He knew how to open the door. If he could do it for the paramedics, he could have done it for himself earlier. He might have been lying about seeing Clements' black leather motorcycle jacket to deflect blame. In any case, he got the feeling that Fletcher was hiding something. He'd question him again.

After reviewing the latest test results, Miles wandered over to Rick's desk. He wasn't there, but was sitting alone in his private conference room. He was typing away at his laptop. Miles could see glimpses of Rick's laptop screen through the sidelight and as he entered the room. He thought he saw Rick using TOR, a high security browser that hid the user's identity. It was a tool that privacy nuts, journalists, hackers, spies, and criminals used to visit web sites anonymously. It was hard to imagine why someone in his office would need it. As Miles walked in, Rick closed the laptop lid and Miles didn't get a good view of the screen.

Rick was usually polite and respectful in front of Anil and the other executives. He knew how to make a good impression with his boss. It was a different story with his subordinates. Rick launched into a tirade "I've been watching the integration testing slack channel. Your code is garbage. You have a memory leak. Did you run the memory leak tool?"

Miles calmly and quietly said that he was careful and there were no obvious leaks. He said he did run the tool and it didn't find anything.

Rick jumped in before Miles even finished, "What about the security audit tool, did you run that". Miles gritted his teeth and explained that he hadn't yet. All the code he wrote was the lower levels that were less likely to have an immediate security impact. Besides the security audit was scheduled for later. Rick quizzed him about load testing and performance testing.

Miles said, "We're doing load some testing now but the main performance and load tests are scheduled for the next sprint". This meant they were going to do the performance testing and tuning in the next two-week period.

This set Rick off. "You are running out of time. I've told you how critical this work is. Next sprint isn't good enough. It has to be done now ", he ranted. Rick was just getting started, "Steve was running this company into the ground. I've told you we were running out of money. Steve pissed away our investment money on 3D printers, laser cutters, CNC routers, and dry ice media blasting machines. All for his personal projects. Thank goodness Anil has sense. If Tim hadn't killed Steve, we'd still be in a death spiral. "

Miles was shocked at this outburst. He had heard that Tim was arrested, but also that he had been released. He didn't know what to think. Rick wasn't done, "I bet Tim silences Brandy so she can't flip on him. I bet he hires a hacker to blow her up in her smart apartment." He gave a sinister chuckle, "Just joking".

Miles didn't think it was funny at all, but didn't say anything.

Rick squinted his eyes and looked directly at Miles. He said "Forget about Tim and Brandy. You need to focus on having a perfect demo tomorrow and finishing this version on time. It MUST be a complete success. I'm personally counting on you. "

After Rick's "motivational speech", Miles felt exhausted. He was shocked at the suggestion that someone would kill Brandy. And, he hadn't known that there was any dry ice in the makerspace. He'd have to take a look later. He went into the kitchen area to get a Coke Zero. On his way back, past the lunch area he saw Detective Martinez sitting at the counter.

Martinez looked up and gave a toothy smile. "You're just the man I'm looking for", he said.

Miles was trying to be calm, but his temper was starting to boil. First Rick and now Martinez. Miles said through gritted teeth, "What do you want now?"

Martinez said, "Let's go somewhere where we can talk privately."

They went downstairs to the conference room that Martinez had been using. There were three people in there having an impromptu meeting. Martinez glared at them and when they didn't immediately leave, opened the door and told them to get out. Martinez and Miles stepped inside the room and closed the door. Martinez sat down but Miles was too wound up to sit.

Martinez said, "You're hiding something from me, I can tell. What didn't you tell me?" Miles thought about telling him about the key shaped piece of paper and the filename on the laser cutter. He didn't think he could explain it in a way that wouldn't make himself look guilty. He thought about Tim being dragged to jail and Brandy being questioned. When Miles didn't immediately answer, Martinez demanded he tell him. He said, "Yep, I knew it, you do know more. Tell me."

Miles said, "I am worried that you will twist my words and use it against me, even though I am innocent. I'm going to see if I can get Joel DeAngelo to sit in with us. At least I'll have a witness."

Martinez said, "Go ahead and call him. He won't help you, there's no corporate liability. "

Miles went upstairs to see Joel. Joel was in his office with the door closed. Miles knocked, and Joel motioned to him to come in. Miles stood in the doorway and told him what was going on. Joel warned him that he couldn't help him with criminal matters but was willing to be a witness to protect the

company's interest. "I can sit in, but if he is going to arrest you, I'll probably have to leave. I couldn't help Brandy much either."

They both went downstairs to the conference room.

Joel sat down next to Martinez, while Miles remained standing. Miles told him that he was under a lot of pressure to get something done, so he hoped they could be done quickly.

Martinez chuckled. "That depends on you. You're hiding something having to do with Tympany's murder. Tell me about it."

Miles answered, "I think I know how the door was opened and have a pretty good idea who did it. I don't know for sure yet."

Martinez scowled at him, "I know that Green hacked the door computer to get it opened and that Brandy held it open for him".

Miles said, "I don't think Tim had the technical ability to unlock the door without setting off the fire alarm, but maybe. I am quite confident that Brandy wasn't in the building that night. If she had been, I would have smelled her perfume."

Joel smiled, but Martinez wasn't having any of it. "What are you, a fucking bloodhound? Forget that, tell me what you do know or I'll arrest you for obstruction after the fact. You can think about what you want to tell me while you're sitting in jail over the weekend."

At this point, Miles had had enough. He couldn't afford to miss Friday's sprint demo. Rick would fire him. And, he was worried the company would go under if they didn't finish on time even if Rick didn't fire him.

Miles said, "Yeah, I do know something that might be related, but I'm not sure about it. Give me until noon tomorrow and I'll tell you who did it, why they did it, and how they did it. If you're not satisfied, arrest me then."

Martinez was skeptical, "You're not going to run, are you?"

Miles stifled an angry laugh, "No, I'm going to be here working".

Martinez realized it didn't matter if he waited a day or not, so he shrugs, "Ok. High noon on Friday".

Miles quickly left the room and went back up to his desk.

A few minutes later, Joel stopped by Miles' desk to chat. Joel said, "You probably shouldn't have promised him, but at least you bought yourself some time. Just remember that Martinez doesn't really care if the person he arrests is actually guilty as long as the DA is able to convict. Be careful." Based on what he's seen from Martinez, this made sense to Miles, though it offended his sense of justice.

Miles tried to calm down. He had two urgent tasks, yet something else was nagging at the back of his mind. His first task was to find the memory leak or whatever's causing the integration test to fail. He reviewed the testing output and his code and tried to think about what possibly could be causing the problem. He would work on solving the murder a little later. He found a few minor memory leaks and a possible conflict with one of the other services. He corrected his code and retested it. It all seemed good. He thought he was done and could now work on the details of the end of sprint demo. He needed to make sure he knew exactly what he was going to do and anticipate any questions that people might ask.

5pm Thursday

By now it was after 5 and the office was starting to empty. Miles planned for his part of the demo and had a random thought. What was Rick joking about? A bomb in Brandy's apartment? Maybe he wasn't really joking. He could have really done it. Or Tim could have, but Miles didn't believe that. In any case, he should warn Brandy to be careful. He went to see if she was still in the office. The guy at the next desk said she had left 10 or 15 minutes ago. Miles hurried back to his desk. He might be able to reach her before she reached the BART station and went underground.

He quickly got out his cell phone to call her. No answer, it dropped to voicemail. In theory BART had cell service underground, but in Miles' experience it never worked. It worked aboveground, but even there it was always too noisy to be useful. She'd be underground for a while, first to wait for a Richmond or Antioch train, and then while the train ran under the bay to Oakland. She'd for sure have service for a couple of minutes while the train was above ground at West Oakland but then it would go back underground through downtown Oakland. Miles texted her to urgently call him back.

Brandy was down in the Embarcadero station trying to get on an Antioch bound train. It was the peak of rush hour. The first train was too packed for everyone to board, but at least she was now second in the queue. She was able to squeeze onto the next Richmond bound train right as Miles called. The phone rang, but she didn't hear it. She tried to ignore the press of bodies as she hung from a strap. Next stop was West Oakland. Hopefully someone would get off, so she'd have a bit more room. A few people

pushed and made their way off and no one got back on. She was able to shift her position and get a little more comfortable. She glanced at her phone and saw that Miles had called and texted her. Sigh, his text said it's urgent, but it could wait until she was home. The train moved on through downtown Oakland and Brandy got off at the 19th St Station. She climbed the stairway with the distinctive blue bricks and thought about her day. That bastard Martinez.

As she was walking toward her apartment, her phone rang. She saw it was Miles Fletcher again. What could be that urgent. Her apartment building was only a block or so from the station.

She answered, "What's the emergency, Miles?"

He said, "I think someone did something to your apartment, it might not be safe."

She pooh-poohed him, "What are you talking about, no one's been in my apartment." She entered the apartment lobby. The elevator was there with the door open. She said, "Hang on a sec, I'm in the elevator" and pushed the button for the 4th floor.

Miles told her that Rick was joking about a hacker setting off a bomb in her apartment. She only half heard him in the elevator. The elevator doors opened, and she started walking down the hallway. Miles repeated what he had told her – that Rick had been "joking" about a hacker setting off a bomb. She got to her front door and paused to listen to Miles. The interior apartment doors were all solid wood 6 panel doors with two small ice pattern glass windows at the top. The doorbell cam saw her and the face recognition software did its job. The lock clicked open. She stood there for a second listening to Miles urge her to be careful. She started to push the door open.

On the other end of the cell connection, Miles wasn't sure what to do. He wasn't 100% sure there was a bomb. But if there was, the consequences would be terrible. Next thing he knew, he heard a loud bang through the phone and then all he could hear was the high-pitched squeal of a fire alarm. The cell connection stayed up, but Brandy wasn't talking.

The bomb worked as designed, except Brandy wasn't fully in the room. The force of the explosion slammed the door shut and cracked the door frame from the wall. The glass windows shattered and blasted fragments and hot gasses over Brandy's head. The door and broken frame slammed into Brandy, throwing her down. Much of the blast and heat was deflected off the door and away from her. She had a few superficial cuts, some bruises and felt groggy from hitting her head on the ground. The interior of the apartment was completely trashed. The windows were all blown out and the roman blinds

were on fire. The fire sprinklers came on immediately after the blast and were soaking the whole mess. Any remaining fires were quickly being put out.

Brandy's phone was knocked from her hand by the explosion. As she got up, her first semi-coherent thought was to call 911 to report the explosion and fire. The phone hadn't gotten far. She found that she was still connected to Miles. She said to him "There was a bomb. I'm alive. I'm hanging up to call 911". And she did.

The firefighters and paramedics came. The paramedics convinced her to spend the night in the hospital under observation. They said she had a concussion and might have internal bleeding. They packed her in the ambulance and took her to the nearby Kaiser Hospital.

Miles was relieved that Brandy survived the bomb. If he hadn't called her, she would have been toast. Who would do such a thing? Miles went over to Lisa's desk and told her that he was on the phone to Brandy when a bomb went off in her apartment. Brandy was alive but Miles wasn't sure if she was hurt. Lisa insisted that they see if Sharon Dowling was still in the office and let her know. Sharon said she'd call the Oakland Fire Department and find out about Brandy.

Miles sat in the break and got another Coke. He tried to relax and calm down. He was still shocked that someone tried to kill Brandy to cover up killing Steve. He still didn't think Tim did it, but it might be possible. It wasn't doing him any good to sit and mope. If he was going to be in the office, he might as well be working.

After a while he got up and went back to his desk and got back to the final prep work he needed to do for Friday's end of sprint demo. It was all working now, but he wanted some practice and to make sure his demo data was ready. He joined one of his scrum team members in the kitchen to make something to eat. He heated some prepackaged white rice and a pouch of chicken tikka masala in the microwave. He brought it back to his desk to eat while he rehearsed for the demo. The team was all working late, finishing up the last minute work and closing out the user stories in the project management software. Two of the developers were still there when Miles got ready to leave around 8pm.

On his way out, Miles walked through the makerspace area. He looked for the dry ice freezer. It was next to the media blasting station. The media blasting station was a closed box with round ports on the front to stick your hands. The ports had thick gloves permanently mounted on the inside so that you could manipulate the part you were cleaning without being exposed to the blasting media. There was a lid and a latch to put in the object to be cleaned. People used anything from sand to walnut shells for

media blasting. Dry ice was a gentler alternative to sand and didn't leave a bunch of dirty sand to clean up.

Next to the media blasting station, there was a small freezer that held the dry ice. Miles opened the freezer and took a look at the dry ice. It was a large block made up of ¼" sheets. There was tissue paper between the sheets to keep them from freezing together. Miles tore a piece of the tissue off the dry ice and closed the freezer. He got the key shaped piece of tissue that he found on Tuesday morning out of his laptop bag. It was as far as he could tell, the same paper. There was a faint blue stripe through both samples that he hadn't notice before.

Even though it was late, Miles walked the 2 miles to his apartment. As he walked along the bay, he looked at his house keys and thought more about keys and locks. He was sure the person who killed Tympani used the laser cutter to make a key. The detective was looking in the wrong direction when he thought someone used computer hacking to open the door. The killer probably didn't have to. They used a real physical key. A physical key would leave no digital trail to follow. And, dry ice was involved somehow.

By this time, Miles arrived at his apartment. The walk had been a good way to clear his head. He still had a lot of thinking to do before both the demo and his promise to reveal all to Martinez. He thought he knew who did, why they did it, but there still were some missing details on the how. He was thankful his apartment was an older one. He had a physical key for the front door and no smart devices. He went upstairs and streamed a classic Chow Yun-Fat movie, while he thought more about the mystery. In the movie, Chow Yun-Fat was a lone good guy cop fighting the bad guys and the other corrupt cops. After the movie, he went to bed. He didn't sleep well. The Hong Kong action movie mixed with his real life situation to give him strange dreams. In the dream he had to do the sprint demo in the crossfire of a shootout between Martinez and Chow-Yun Fat. Normally, end of sprint demos didn't cause him any stress. But it did this time. It was the fact it wasn't a normal demo. All the executives would be watching. Oh, and he had to solve the murder or Martinez would haul his ass off to jail for the weekend added to the stress.

Miles woke up at 5am and couldn't get back to sleep. He tossed and turned and thought about the murder. He gave up around 6 and got up. He caught up on the news online, took a shower and walked to the office. He didn't bother to have breakfast. He'd get a bagel or a donut at the office. During his walk, he got a text from Brandy. She thanked him for warning her about the bomb and told him that she was ok and getting out of the hospital that morning.

8am Friday

The office was almost empty when he got there. There were a couple of sales guys who had just got out of the gym shower bantering with each other in the kitchen. They went to their desks and made their calls to the east coast.

Miles checked the status of the sprint in the project management software. There was one bug that was closed after he left and all the user stories were marked as finished. That much was good. He checked the code repository and saw there was a check in and deployment to the test server after he left. What the fuck? One of the more junior developers fixed a minor bug and redeployed. Miles hoped that the fix didn't break anything else. He didn't need the added stress this morning. There was a small chance that the bugfix broke something else in the code. It was unlikely, but he needed to re-run a bunch automated of tests to be sure. And, he needed to run through his part of the demo to make sure it was all working. Miles kicked off the automated test suite and hoped for the best.

While he was rerunning the tests, his mind went back to his other problem. He was pretty sure the killer made his or her own key in the laser cutter. But how did the killer get the design for the key? A locksmith would have to have a copy of a key to make another one. Wouldn't the killer? Miles worked backwards. He thought about what he'd need to make a copy of the key out of wood or other substance using the laser cutter. He'd need a DXF file of the key. To make the DXF, he'd need a CAD design of the key. That much was straightforward. How would he make the CAD model? If he had a key, he'd precisely measure all the dimensions and input them. He had a flash of insight. Or, he could do like Ravi said, when they were drinking at Pier 23, and use a photo. He could take a digital photo and import it directly into CAD. Damn, that could be it. The killer could have turned a photo of the key into a real key. He'd read articles that this could be done, but he'd never heard of it actually being used. Steve always kept his key in a lanyard around his neck. It would be in every company photo. Dozens of people would have photos of him that included the lanyard and key.

He thought he now knew how they did it. What was left was who and why. In Miles's mind there was only two viable suspects – Anil and Rick. Both had good motives. Anil to move up in the company, and Rick to keep the company on track so he could cash out in an IPO. Rick certainly had the technical skills to make the key. Miles wasn't sure that Anil did. You wouldn't expect a finance guy to know this stuff, but Anil wasn't the usual finance guy. Miles discounted Martinez's Tim and Brandy theory. He didn't think Tim was detail oriented enough to pull it off without leaving a bunch of clues. He didn't know well enough how to cover his tracks with the card key cron job.

Miles' boss and other team members arrived. They were all keyed up about the upcoming demo. Also, the ones that were in the office at the time heard about the bomb in Brandy's apartment, but the others had no details. Miles didn't have time to gossip about what had happened, so he told them the short version of how he was on the phone to her when the bomb went off. Miles knew that she survived, was held overnight in the hospital and was getting out today.

Miles told them about the late check in and deployment. One of the Russian developers groaned and said something in Russian. They scrambled to double check everything. Lisa pulled the junior guy into a conference room for a private chat. She wasn't one to yell, but she'd get her point across. He wouldn't make that mistake again. He came out, apologized to the team, and immediately pitched in to help check the results.

Rick walked past the team as they scrambled to finish their final preparations for the demo. He said, "Don't screw this demo up, everyone is watching." He stopped to look over the junior guy's shoulder. Something on his laptop screen caught Rick's attention, and he bent over to look more closely at it. He stood up, looked right at Miles said sarcastically, "And before the demo, Jessica Fletcher here, is going to solve the mystery of the locked cave. Isn't that right".

Miles glared at him but said nothing. He hadn't heard the that epithet since he was in high school.

A few minutes later, Lisa sent a message via the slack channel that because of all the interest in the demo, they would do it in the large downstairs boardroom. The boardroom had a large reclaimed redwood table that seated 12 comfortably. There were some extra chairs around the edges. The executives, the scrum team, and some of the middle managers would fit. The rest of the interested parties would call into the webcast. They usually did end of sprint demos using the company's webcast software anyway, but this was getting special attention. At 11:30, Miles and two other members of the team picked up their laptops and went downstairs to get everything set up for the demo. No matter what webcast software they used, there was always 10 or 15 minutes of futzing around to make sure it was all working. The rest of the team joined them once it was working.

Shortly before noon, Detective Martinez stuck his head into the conference room, looked around at Miles, and stepped out. Miles thought that Martinez must know about Brandy and the firebomb. Surely somebody told him.

The execs started filtering into the boardroom. Don Salmon, the Sales VP was the first to arrive, followed shortly by Sharon Dowling. Martinez came in and leaned casually on the wall in the back corner. Rick Clements and Anil Patel arrived at the same time. Anil sat at the head of the table with

Rick taking the seat next to him, which happened to be next to Miles. There was nervous chitchat going on in the room while people waited for the demo to start.

While Rick was sitting down, Miles asked him apropos of nothing, "Have you ever been to England?" Rick was puzzled why Miles was asking, but answered, "My uncle was a Chemistry prof at the University of Manchester. I spent several damp summers at their house as a child. I've only spent a couple of days in London on business, since".

Lisa stood up to start the meeting. As she stood up, everyone quieted down. She said, "Welcome to the Sprint 6 demo. Can you please close the door? Thanks. The team will be demonstrating the following user stories. ".

As she started listing the user stories, Martinez interrupted. He said, "I know this is important for all of you, but Miles Fletcher promised to explain Tympani's murder at noon today." There was whispering around the room. About half of the people had no idea who this guy was and what was happening. Martinez continued, "Let's get that out of the way first and I'll leave you to whatever it is you do here".

Miles pushed his chair back, stood up and stepped to the front of the room. He was more comfortable talking while standing and walking rather than sitting at a table. He had some thoughts about what he would say, but it was coming together while he talked.

Miles started, "Detective Martinez thinks I killed Steve and the easiest way I could think of to prove I didn't do it was try to figure it out myself. He thinks I did it because I was the first person to find the body and I was the only person who admitted to being there that night. "

Martinez stood in the back and watched with interest.

Miles continued. "I never thought Tim Green had anything to do with Steve's murder. He never had a motive that I could understand. He has shown no signs of the technical skills necessary to pull it off. If I recall correctly, he has an environmental engineering degree - not anything computer related. His one attempt at using a computer to cover up his actions was completely obvious once someone bothered to look.

The theory that Tim did it with Brandy's help is also full of holes. It relied on Tim being able to hack the cave door open without setting off the alarm. Like I said, there's no evidence that Tim could do it. Anna, who built the lock system, does solid work. It wouldn't be easy to hack that door computer and get the door open without setting off alarms."

“The next person I thought about is Anil.’ Anil, gave him an questioning look. “Sorry, Anil, I had to think about everyone. And as I’ll explain, there were a few things that pointed in your direction. Anil had motive – he became CEO after the murder. He must have seen financial problems ahead and warned Steve. When Steve took no action, Anil had the motive to remove him from the picture, but he didn’t. In terms of technical ability, I don’t know one way or another if he had the skills. You’ll see as I continue.

I also thought maybe Don Salmon had something to do with it. I had heard stories about Don and Steve having a fistfight once so maybe something similar happened. And, Don has the technical skills to hack the door. However, he was in Boston at the time and couldn’t have done it. I assume his alibi checks out.” Miles stopped and looked at Detective Martinez.

“Yeah, he checked in at the Cambridge Marriott and was on the passenger list for his flights. I’m sure we could turn up some security cam video if need be. Pretty clearly he was in Boston at the time.”

Miles went on. “That leads us to the final suspect. Rick Clements killed Steve Tympani.” There was an audible gasp in the audience and stony silence from Rick. “Like Anil, Rick was angry that Steve was running the company into the ground. Even worse, he hated the fact that Steve spent money on the makerspace. I suspect he had an argument or confrontation with Steve about this early on Monday night before deciding to kill him. “

Martinez piped up, “Yes, that would explain how Clements knew what kind of scotch Tympani was drinking. Unless he’d been in the cave, he would have never known”

Miles walked over to his computer bag and pulled out the key shaped tissue paper. He said, “I found this in the recycling bin nearest the cave door” and held it up. “It’s a piece of tissue paper shaped like a key. It has a brown ring around the outside and smells burned like it was cut with a laser cutter.” He walks over and hands the paper to Martinez. “If you notice it has faint blue lines in the tissue. I didn’t notice those until last night.”

He continued, “After I found the paper, I checked out the laser cutter. The computer that controls the laser cutter is on the network. When you turn off the laser cutter, it just turns off the cutting hardware itself. It doesn’t turn off the controller. I was able to log onto the controller and see the last filename. Unfortunately, the file had been on a thumb drive and I wasn’t able to retrieve it. “ He went to the whiteboard and wrote c@rd1c3.DXF. Miles kept going, “This is the filename. It’s ‘leet’ for cardice.” He wrote CARDICE underneath the leet spelling. “This had me stumped for a while and then it pointed me in Anil’s direction. Cardice is a British term for dry ice. I had never heard of it before. Don might have known it too and I didn’t think Rick would know. I wasn’t completely sure Rick was the culprit until just

now. That's why I asked him if he'd ever been to England. The thing that seals the connection is that the tissue that separates the layers of the dry ice in our freezer has the same faint blue lines."

Rick had heard enough. He was nearly shaking with anger. He stood up and said forcefully, "I don't have to sit hear and listen to this crap. Especially from the likes of you. It's crap. You have no proof. None of this points to me. Yes, I was angry that Steve was pissing away our capital with the equipment and staff to media blast decades of old paint from his precious Victorian gingerbread medallions. Sometimes he was more interested in 3D printing restoration parts for his old house than in building this company. That doesn't mean I killed him. And, I did confront him in the cave earlier in the evening. He had a call with some people in China. We had a lively discussion just before his call. I wanted him to take the steps necessary to save the company. He refused. He still thought this new version would save us. But, when I left, he was alive and well. I didn't kill him. Maybe you did. You were still there, you could have made the dry ice key from a photo just as easily."

Miles smiled, "Thanks for confirming that you made the key from a photo." Miles turned to Martinez, "Just to be clear, Rick used a photo of the key to program the laser cutter to make a copy out of dry ice. To give it some structural reinforcement, he used a piece of tissue paper between two sheets of dry ice. Dry ice is called that because it doesn't melt into a liquid. It's frozen carbon dioxide gas and instead of melting to a liquid like water ice, it goes directly to a gas. The key literally disappears in thin air. Except the scrap of reinforcement that you're holding in your hand. "

Martinez looked at Rick and said, "You should sit down, or would you like me to cuff you now? I want to hear the rest of this. What was that about using a photo?"

Miles said, "Yes. Steve kept his key in a pouch on his lanyard with his BART Clipper card and office cardkey. It was visible in all the photos that he was in. Rick used a photo to get the geometry of the key into a CAD program and from that into the laser cutter. I've read about people doing this, but I've never seen it done before. It's a pretty clever way to get through the door. The key might have been fragile, but it was good enough to let him in and out"

Miles asked, "The office grapevine says that Steve was killed using a foam cutter wielded like a sword. Is that true?" Martinez nodded. Miles expounded further, "It was the other thing that I initially thought pointed at Anil. It turns out to be a coincidence that Anil has a background in fencing. And what time did the doctors say Steve died?"

Martinez said, "The ME says between and 9 and 10pm."

Miles said, "I wasn't paying attention to the clock, but I swear I saw Rick's black motorcycle jacket hung up near his desk when I got a snack around 8:30 but the jacket was gone when I went to the bathroom after 10. I presume that Rick was here until sometime after 8:30 and left before 10. Rick made a mistake, not realizing the card key would log the time of his exit. But, as we know Tim inadvertently covered it up. "

There was a knock on the boardroom door. It was Brandy. She was wearing sweat pants, a tee shirt, and a fleece jacket. They were obviously borrowed clothes. She had a small band-aid on her forehead and walked tentatively, like she was still hurting. Someone found a seat for her.

Martinez said, "I got the cell phone location records for Rick. There's a gap in the records between 7pm and 10pm. He was here at 7pm and home at 10pm. There is no record of his phone's location in between. He probably turned it off so that we couldn't track it. I'll have my computer tech guys go over his phone and find out for sure."

Miles said, "Right. When you arrested Tim, Rick must have thought he was going to get away with it. But when you let him go and couldn't get anything from Brandy, he got nervous. He figured you might eventually look at him. He figured that if Brandy was killed, you'd concentrate on Tim and be able to make it stick. If Tim did it, he'd have a clear motive to kill her to keep her from testifying against him. With Brandy gone, your theory of Tim and Brandy working together would hold water."

"So, Rick used what he had learned at his previous stint working with IoT devices to good use. I don't have proof of this, but I did see Rick using TOR to cover his tracks".

Martinez said, "I think I've heard of TOR. Isn't that what the dude who ran the drug website, Silk Road, used? "

Miles agreed, "Yes, probably. Anyway, I heard Rick 'joking' about Tim hiring a hacker to kill Brandy in her apartment before it happened. I was able to warn her, and she thankfully avoided serious injury. It was a close thing."

Rick again stood and snarled, "You don't have a shred of evidence. It's all conjecture. I don't have to stand for it. By the way Miles, you're done here. You're fired."

There was a commotion in the room as several people tried to speak at once. Anil stood up, put his hands out to quiet the room and said, "Rick, why don't you go with Detective Martinez now. I've heard

enough. Miles, thank you for your presentation. It was most illuminating. You are certainly not fired. Let's take a half hour break and then get back to our scheduled meeting.

<The end>

Monday 6pm. Before the main action

After his last meeting for the day, Steve Tympani sat at the desk in his lair and reviewed the company financials. He poured himself a glass of Lagavulin Islay 12 year old whiskey. The whiskey deserved a touch of water, but Steve couldn't be bothered to get it. He texts his wife that he will be working late and not to expect him until after she went to bed.

The spreadsheets didn't look good. Their revenue was not nearly what the costs were. This was normal for a startup, but still not good. The worst part was, the cost of adding customers was greater than the revenue they were getting from each customer. Cash was getting short and the company had grown too much for him to just transfer money from his personal accounts to the company. He just didn't have that kind of cash - everything was tied up in his house and other real estate. He would have to push his team hard to get the new version done and count on it pulling the company up.

While he was figuring this out, a message popped up on his display from the CTO, Rick Clements wanting to talk with him in person. Steve replied "I'm in my cave, not in my office. Come down and I'll let you in. I have a phone call with the Chinese at 7:30 so we'll have to make it quick" Steve got up, and went to the door. The door to the cave was always locked and Steve had the key on his lanyard along with the office ID/cardkey and BART Clipper card. Steve unlocked the door and let Rick in. A minute or two later, the lock automatically clicked shut.

"So, I was looking at the financials while prepping for the board meeting. We are getting really close to the edge. We need to take action right away or we risk having to shut down." Rick said. Steve said, "Yes, I'm going to be here late doing that myself after I get done with our guys in Shenzhen. Anyway, I was also looking at the numbers to figure out the best way to get some breathing room. There isn't an easy answer. Our best bet is to push hard on getting the new version out. It will make a big difference increasing revenue per customer. Our customers will stop evaluating and start rolling it out volume to their users. It may take a few months, but the revenue will pick right up."

Rick agreed, "Yes the new version will make a huge difference, but I'm worried about the time element. It usually takes longer than we want to deploy and there's always a delay our customer's IT folks rolling it out. We need to cut expenses now, particularly in Sales & Marketing and also in the makerspace shop. We should be looking at laying off some of the staff."

The shop was one of Steve Tympani's favorite things about his company. He was not happy to hear this.

Tympani said flatly “No. We’re not going to cut staff. We need to hit our deployment schedule and market the hell out of the new version.”

Rick was getting heated. Almost yelling, he said “I will make sure my team delivers. But I have no control over customer adoption. I’ve worked too hard and we’ve come so close to success for us to fail. Cut your pet project - at least cut the shop hours. And cut back on the sales bro’s expenses until we turn the corner. They don’t need to fly everywhere at the drop of a hat and eat rib-eye every night.”

Tympani was getting pissed off but kept it to himself. He said quietly through clenched teeth “You will push your team hard to meet the schedule and if you’re wound up about the financials, get them to bring their dates in. The rest is my job.”

At that, he got up and unlocked and opened the cave door. Rick got the message and stormed out.

Back at his desk Rick was quietly furious. Of course he’d push his team and they’d perform. They knew the consequences of failing. They’ve all been through crunch time with a startup before and they’d work 24x7 if necessary. But, Rick was sure it wouldn’t be enough this time. The spreadsheets didn’t lie and hope wasn’t a viable strategy.

Unlike Tympani, who had made a pile at a previous startup, Rick was basically broke. He was making good money, but between child support to his ex-wife, his never-ending student loan payments and San Francisco rent, he barely made ends meet. He needed this company to succeed and get to an IPO for both the money and the respect from his peers.

He sat there thought through all the possible scenarios. The only one he could come up with that would save the company was to replace Steve Tympani with someone else who’d listen to reason. Steve wasn’t going to quit, that’s for sure. Rick thought maybe he could frame Steve in some kind of scandal or rumors of a scandal. That would take too long and most likely damage the company. Maybe he could get the CFO, Anil Patel, to go along with a coup. Anil was, in D&D terms, lawful evil. His natural tendency was to screw people over but only by following the rules. He’d be loyal to his boss, but if the boss was to be removed...

That was it then. He’d have to take care of Tympani, the sooner the better. He knew exactly how to do it and get away with it.

First, he turned off his phone and put it into a metal desk drawer. He'd leave it turned off until a few hours after he got home, in case the cops tried to use his cell phone location to link him to the murder. It wouldn't give him an alibi, but it at least would add some doubt.

In order to do the deed, Rick needed to get into the cave. There was only one key and that was on Tympani's lanyard. First he thought he might be able to hack into the lock to open it up for him. There was a computer connection, but Rick didn't know anything about it. He thought he could do it but he wasn't sure he could do it quickly enough and without leaving a trace. He had another idea – use a photo to make a key.

Fortunately for Rick, he had several photos of Tympani where the key was visible. In order to make sure there wasn't any evidence, Rick fired up a temporary virtual machine in Amazon's cloud service using the companies software testing account that was shared by a dozen or so people. He could do what he needed and no one would trace it back to him. A virtual machine is a simulated computer in another computer and can be created and disposed of at will. When he's done the only evidence will be that someone from their office had created and destroyed a VM, something that happens many times a day. Rick paged through his photos and found a good one where you could see the key geometry. Rick downloaded some CAD and photo modeling software onto the cloud VM and got to work modelling the key from the photos. He one shot to use it, so he had to get it right.

By this time it was after 8 and there were only a handful of people left in the office. He didn't know how late Tympani would be staying so he had to move quickly. It wouldn't do for his homemade key to be found - he had a clever plan. He'd use the laser cutter to cut the key out of dry ice. Tympani kept the makerspace stocked with dry ice so he could use to media blast old paint from his precious Victorian gingerbread medallions and molding.

Dry ice is called dry ice because it sublimates - that is goes directly from solid to vapor. There's no liquid melt. By itself, it might not be strong enough for a key, but two thin layers of dry ice reinforced with a little paper, it would be. He'd have to handle it with care and use gloves to avoid frostbite.

Rick copied his design onto a thumb drive and made his way downstairs into the makerspace. Along the way, he passed Miles Fletcher at his workspace with his head down coding and his noise reduction headphones on. Miles was in a zone and not aware of anything but his code. At the bottom of the stairs, he could see Tympani in his cave via the display on the door but other than him, there was no one downstairs. The makerspace was deserted. A 3D printer was whining away unattended.

Rick got a pair of welding gloves to protect his hands and grabbed a thin sheet of dry ice. He broke it in two and put a piece of tissue paper between the two sheets. As long as it was thin enough to fit, the exact dimensions wouldn't matter. The heat of the laser would tend to weld the whole thing together which is what he wanted anyway. He mounted it on the laser cutter and put the thumb drive in the slot. loaded up his design and started cutting his two layers. It didn't take long.

He took the thumb drive out of the machine, turned the cutter off and smashed the thumb drive with a hammer. He put the fragments into the metal waste container next to the CNC machine where no one would look.

His dry ice key looked pretty good and would disappear into the air in an hour or less. Rick had to make sure that he didn't leave other clues or get any blood on him. Since he was just in the room a few hours before, he didn't have to worry about fingerprints, DNA or fiber evidence. He grabbed a leather welding apron and a foam cutting blade. A foam cutting blade is like a 3ft long razor blade. The welding gloves would protect his hands from both the blade and the ice key.

Rick made his way to the cave door. He could see Tympani working away with his back to the door. He quietly and carefully put his key into the door. It worked. He opened the door and took the key out. He held the key in his left glove and the blade in the right.

Tympani was engrossed in his spreadsheets and didn't notice. Rick moved quickly and quietly to Tympani's desk. Tympani didn't move - he didn't expect to be disturbed in his locked room late in the evening. Without saying a word, Rick slashed his boss across the side of the neck with the makeshift sword. Blood spurted all over the monitor and Tympani turned toward his attacker in shock and started to stand up. Rick viciously slashed him again in the throat, lacerating deep into his larynx. Tympani threw his hands up to defend himself and was slashed across the meat of the left hand under the thumb.

Tympani tried to stand and yell and failed at both. He fell out of his chair and collapsed on the floor. Rick slashed at him two or three more times until Tympani stopped moving. Rick didn't notice but some flecks of blood ended up on the apron. The blade and the right glove were covered in Tympani's blood, but that didn't worry Rick. He dropped the glove and blade. He hadn't touched the blade with his hands so he wasn't concerned about fingerprints. He didn't think there was any way to get fingerprints from the insides of the rough leather gloves. Too many people had used these gloves to get useful DNA - he hoped. He kept the left glove holding the ice key. Tympani still wasn't moving. Rick couldn't tell if he was still breathing and didn't want to touch him to check for a pulse. In any case, he was pretty sure

Tympani was dead, or at least would be soon. Using the ice key, he let himself out. He tossed the key into a recycling bin next to the first open desk knowing that it would sublime before anyone found it. He hung the apron up after giving it a once over – there was no visible blood on it and on the left glove. He put the glove back on the shelf with the other equipment.

Rick calmly walked up the stairs – Miles was still there and still hadn't moved – got his jacket and left the building using his card key. He didn't stop to think that the card key log would show his exit.