APEX

Uplift's rapid ascent was exhilarating, but Brandon and I were overwhelmed. We were both full-time PhD students at one of the most demanding universities in the world. Worse, the Air Force only gave me three years to complete a program that took most students six. I would be reassigned after those three years, which meant I faced immense pressure to both finish my PhD and transition Uplift's work into the Air Force or another entity.

I had sailed through every school in my life, but my PhD classes crushed me. Worse, my research proposals floundered with my faculty. I wanted to leverage a scientific paradigm called complexity theory, which had transformed other academic disciplines but barely touched Political Science. I met stiff resistance. I also wanted to study armed groups in Syria, but one of the department's most distinguished professors told me I could not study Syria because of data challenges. I was aghast at a philosophy of science that fenced off the world's most urgent contemporary problems because they weren't conducive to fashionable methods of inquiry.

I failed to build a single meaningful relationship with anyone on faculty that year. I had no idea who might serve as a dissertation advisor. Every research idea felt like a dead end. The three-year deadline approached like a slow-motion train wreck. My stress mounted, the first twisting and straining towards personal failure.

I achieved good grades and took my comprehensive exams a semester early, but my faculty saw me as hopelessly distracted. No one supported the Syria Airlift Project or even showed interest. One professor refused to let me miss a single class to attend a humanitarian conference, where I was scheduled to present. I went anyway, securing a $40,000 grant while there. I permanently lost his trust.

Brandon was in a similar position. He overcommitted to the Syria Airlift Project, fell behind in his studies, and found himself on shaky ground with his advisor.

Still, the Syria Airlift Project was succeeding. We had to press ahead.

Because we studied full-time, we struggled to advance Uplift's goals during Stanford's hectic ten-week quarters. We sometimes flew on weekends, but our roadmap mostly involved surging during breaks.

Over Christmas break we planned to focus on airdrop capability at long ranges. During spring break I wanted to conduct a major demonstration in California involving Syrian refugees. If that gained us enough support, we would try to replicate the demonstration in Turkey over the summer. That would give us everything we needed to make our first flight across the border into Syria—if we could just convince the right authorities. Maybe then we could transition the project to another organization.

On the other hand, if we could not get to Turkey in the summer, we would probably need to abandon the effort. Brandon and I could not afford to give the project another year.

The pressure was on.

Christmas break was exhilarating. Jessie flew out to join us. We laid out our vision and goals for the nonprofit. We continued to struggle with technical setbacks but also began crossing milestones:

consistent, reliable flights, automated takeoffs from a bungee launcher, package airdrops, a simultaneous flight of two drones, and a 50-kilometer flight. Later, we achieved 100 kilometers. A drone company donated thousands of dollars of hardware, enabling us to build a new drone fleet. After the months of failure, these successes felt amazing.

We didn't have time to congratulate ourselves.

Spring break was fast approaching. If we wanted to conduct a major demonstration, we needed to prepare now.

Brandon and I did not feel ready. We were rushing the engineering. We needed bigger, more capable planes for the demo. Jessie urged us to go big; this was a make-or-break moment, and we would not have another chance.

I knew she was right.

We made the gamble.

A Syrian friend of mine led an Arab refugee center in Sacramento. I suggested we partner to run a Refugee Empowerment Event, in which we would teach refugees to operate several planes for humanitarian deliveries. We would show the world this project was not simply about flying drones, but about empowering refugees to bring aid and healing back to their country.

We ordered four new, larger planes. This was a huge risk. Preparing a new type of aircraft required considerable work and we had no idea how well it would perform. We christened this aircraft the "Waliid," named for the heroic doctor I had met in Turkey.

Finding a location to host the event proved to be our hardest challenge. Whenever we mentioned Syria and drones, institutions recoiled. Syria conjured up images of terrorism and war. In some cases, it evoked fears of Arabs and Muslims; the "flying bomb" scenario crossed everyone's mind. Even progressive organizations fretted over liability. We called everyone we could think of,

including civil airports, universities, and farms. Nobody would support the event.

My stress mounted with each passing day. For the first time in my life, I had consistent trouble sleeping.

The stakes kept rising. A veteran BBC film crew learned about our event. I warned them that I could not guarantee success, but they insisted on flying out from the United Kingdom. A world-leading drone company planned to send several engineers.

The lack of a suitable location became a crisis. Desperate, Wendy and I jumped in the car one Saturday to personally visit three RC airfields in Sacramento. One club refused to even meet with us; they suspected nefarious intent, raised doubts about whether I was even in the Air Force, and spread rumors that we were up to no good. A second club got word and brushed us off.

At the third club we finally found an ally. Just two weeks before the event, Norman—the club president—agreed we could use his field. We breathed a huge sigh of relief.

Eight days prior to the event, Norman sent me a devastating email. His club members had mutinied when they learned about the event. They had convened an emergency meeting behind his back in order to vote. Our prospects didn't look good, but he said I could attend the meeting to plead my case.

Resistance was back with a vengeance.

So was my insomnia.

Jessie and I rehearsed the entire two-hour drive to the meeting. Our reception was cold. Jessie did a masterful job thawing the audience before the meeting officially started. It didn't hurt that she was charismatic, earning her private pilot's license, and female.

I gave my talk everything I had. I showcased my Air Force service. I talked about our country's foreign policy struggles in the Middle East and our opportunity to do something in the world that America could be proud of. I evoked the memory of the Berlin

Airlift. I asked them to give us a chance.

The vote passed 11-9.

After the vote, Norman met us in the parking lot. He explained that he had been an Army Ranger in Vietnam. He had seen and done things he was not proud of. He believed in what we were trying to do, using airplanes to bring some good into the world.

There was just one more thing, he said.

You'd better not fuck this up.

That remained a grave concern.

Waliid, our new plane, was still not ready. Brandon had worked around the clock to modify the airframe for payload delivery. One week before the event, he finished the first plane. The craftsmanship was exquisite. But would it fly? We had such poor success with many of our previous planes.

We took Waliid 1 out that afternoon for trials. It flew remarkably well at first, but then tragedy struck. On one takeoff, the bungee launcher failed to disconnect from the plane. When it went taut, it dragged the plane back into the ground at maximum speed, where it caught fire.

The plane had crashed in a marshy patch of the lakebed, and the fire mercifully fizzled out in a puddle. However, Waliid 1 was wrecked. The fuselage had broken in two, and the burning speed controller had badly charred the aft section. I could only stare.

We were one week out from the event and did not have a flyable airplane. We were failing, with the BBC reporters arriving the next day and world-leading drone engineers watching over our shoulders. I was scheduled to speak about the project at the Embedded Linux conference in San Jose the next day.

That night I returned to Lake Lagunita, alone. The lakebed was still and cool and quiet, ringed by silhouetted trees.

I sat in the grass, looked out over the moonlit lakebed, and

broke down in tears.

We were failing. We had tried so hard, invested so much, and achieved so many milestones. It all culminated in this moment, but without Waliid flying reliably, the event would flop. We would share our vision and throw a few small planes in the air to entertain the children, but it would be a disaster. BBC would go home empty-handed. We would be a laughingstock.

I had never known a failure of this magnitude in my life.

In the morning, after another night of tormented sleep, I received a text from Tomoki, an undergraduate volunteer on the project.

I fixed it.

I did not understand. I met Tomoki at his dorm, where he showed me the miracle he had wrought. He had painstakingly reconstructed Waliid 1's fuselage, replaced the speed controller, and returned the plane to a flyable condition.

The universe had delivered Assistance again.

That afternoon I spoke at the Embedded Linux conference, to an audience that included the "who's who" of the drone engineering community. We had been courting some of these developers for months. They loved what they heard and wanted to help. Our project tended to inspire engineers, who longed to use their skills for good but had no idea how.

We showed off Waliid 1. When I told the story of the crash and the miraculous reconstruction, the audience laughed in approval.

Brandon redesigned the defective bungee hook, and our test flights went perfectly.

Waliid was flying.

Our team members flew in from around the country. The BBC

film crew arrived. My good friend Brian, a professional videographer, flew in from Seattle to shoot a fundraising video.

We were exhausted from the Stanford winter quarter but also bristling with energy. We felt like we were heading into the Super Bowl.

Our Refugee Empowerment Event would be the last two days of spring break, which gave us several days to prepare. We worked around the clock, doing final engineering in the mornings and then test flights in the afternoons.

I still felt sick with anxiety.

Two days before the main event, everything came together perfectly: flight after flight, each one flawless, each one delivering a 1kg payload bundle. We wouldn't feed a city this way, but we could deliver high-value, low-mass medical supplies to hospitals that the Syrian regime continually besieged and bombed. Our Syrian partner organizations told us this would meet a real need.

I was delirious with relief.

Wendy ordered us a takeout dinner. As the sun set over Lake Lagunita, we gathered family-style around picnic tables to share a meal. For a few minutes the pressure was off, and we ate and laughed and talked. This remains my single favorite memory from the project: sharing a family dinner together and seeing that we had built a real team.

That Friday we bought food, filled coolers, rented generators, and loaded up U-Hauls. The next morning, we rose at dawn, headed to the airfield, and set up. We were ready for action when our Arab volunteers arrived, looking unsure of what they had signed up for.

I welcomed them in Arabic and then we got right to work explaining the airplanes and how they worked. We taught our

volunteers how to run preflight inspections and then formed groups to walk through the pre-flight checklists and launch sequence.

Once the first plane launched and the first package parachuted down, our volunteers finally grasped what we were trying to do. They were enthralled.

We launched plane after plane. The children decorated the airdrop boxes with hearts, animals, and messages for Syria. A group of women made parachutes out of garbage bags and string.

When we started airdropping candy, the excitement reached a crescendo. Kids laughed and screamed and ran about as candy rained down from the sky. I had borrowed the idea from the Berlin Airlift of 1948. A year of grueling work had gone into creating this magical experience, and I looked away to hide my tears. I could only dream about recreating this perfect moment for children in Syria.

That night we slept in a massive rental house that Wendy had found online. We ate another family dinner, held a rushed board meeting, and then shared a big pancake breakfast in the morning. We did the whole performance again on Sunday, with a larger group.

The event was a remarkable success.

Afterwards, I gathered our group and tried to hold myself together while I expressed my pride and gratitude for all that they had accomplished. Recreating this event in Turkey would be our next major goal. If we could do it here, I told them, we could do it there.

We drove home happy but utterly drained.

Stanford's spring quarter started the next morning.

EATING GLASS

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