Agile Principles for Business: The 10X Effect

The Proven Tools That Will Improve Your Outcomes 1000%

Preview Edition

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Forward

When I wrote my first Agile book, Scrum Marketing, more than four years ago, I warned the readers that "Through several iterations, I may publish a full-sized book on the topic." The next iteration is here. This preview contains the first section of that full-sized Agile book. While only a small portion, there's enough here to get you started on the topic and be of value. It's my Minimum Viable Product, and since it's the "minimum," I'm distributing it for free among my current contacts and anyone else who asks for it until the full version is published. Though free, please respect my copyrights and do not post it or otherwise distribute the PDF.

On a warm Sunday evening in 2017, I was driving to a church meeting with my son and brother-in-law. The former was asleep in the back seat, and the latter was asking me about my most recent consulting client. After I droned on for about five minutes about the successes and unfinished challenges, he said something like, "Well, Agile is popular everywhere now. In a few years, it will be something else."

The first part of his statement is correct: Agile is popular. Back in 2013, I did a survey on the relative popularity of Agile versus other business philosophies. I thought that the best, most objective way to rank them was by looking at job listings. I selected Dice.com as the source of my search with my first book. Below are those results along with then-updated numbers of late 2018 to show you the trends.

	2013	2018
ISO 9000 & 9001	335	246
Six Sigma	851	518
PMP	2,111	1,657
Agile/Scrum	12,208	15,258

As you can see, in order of magnitude and trend, Agile is taking over as the dominant approach. Indeed.com identified 93,942 jobs when I recently performed a search using a few Agile buzzwords, such as "Scrum."

The core hypothesis of this book, however, is that the second part of his comment—that Agile will give way something else—is wrong. The reason for this is that the principles have been around forever and were not invented by anyone—they were discovered. Scrum, Kanban, and all the other methodologies built on top of them were invented, have changed, and will continue to change. Those may give way to new and different methodologies; however, Agile principles will continue to work regardless of what they are called or how popular they may be. "Agile" as a category name may be tossed out and be replaced with a new, cooler term along with new sets of practices, but that won't invalidate the core contents of this book. True principles are eternal and will always be generally applicable.

Agile with a capital "A" has been around for less than twenty years as a defined set of ideas. Scrum has claimed to have been created in 1995. Kanban in one form or another has been around since the mid- to late-1950s. Today, we have other variations of methodologies, such as Scaled Agile Framework (SAFe), Large Scale Scrum (LeSS), and the multitude of newer Agile-like business techniques, such as lean business, Business Canvas, and Agile marketing. Expect more.

The focus of this book is the underlying principles and concepts for why these methodologies, philosophies, and techniques work. These principles are what I would describe as "self-existing truths." After you understand the relationship between facts and principles and how to apply principles in your business and your life, you'll be able to select the tools that will work best for your organization and customize them for maximum impact. Hence, this book's goal isn't to convert you to a standardized way of doing things, but convince you to incorporate these principles to meet your needs. It's about becoming, not doing.

I don't want you to necessarily work harder or smarter, but identify how to think, feel, and act differently to achieve more and make the impact you want. I am confident that the contents of this book can help you do that. I'm not trying to sell you flashy tricks, glitzy programs, a particular software tool, or an action plan. I'm going to give you the fundamental concepts that have been discovered that work, then teach you to identify others to implement in your own changing circumstances.

Agile is not a predefined set of rules that apply uniformly to every organization in an orthodox approach. (Some people and consulting firms will tell you it is.) Agile principles with appropriate supporting methodologies ALWAYS improve the performance of organizations when fully embraced. Everywhere I've seen these principles applied with committed leadership, they have always worked. The worst I've seen them perform resulted in improvement within two years. There have not been any exceptions. I've seen 10X improvements several times, and much better—up to 250X in one year. However, as we'll discuss later, many don't embrace the principles but instead focus on the practices, and so more than half of larger Agile transformations in companies fail. They fail to deliver that big success or even create net positive value.

I've had seasons of great business success and seasons of disappointment. I've noticed that, except for the intervention of luck and unexpected events that life throws at us, my successes came when I held fast to the principles about which I write in this book. Like every other imperfect person, I've been inconsistent in my dedication to applying them and found that one might ignore certain principles but can't stay immune from the consequences of doing so. While some seem to soar to the heights of triumph by employing other approaches, while others are never able to get off the ground even with strict adherence to these principles, I plan to demonstrate that achieving what you want in this life is far more predictable and probable when you understand Agile principles and use them.

This book will include several recurring metaphors and analogies. I apologize ahead of time if you feel their application is repetitive, but I've learned through disappointing and reaffirming experience the power of repetition of the basic concepts with recognizable imagery. Without something to remind you, it's easy for the forces of inertia, tradition, misdirected self-interests, and habit to inhibit the internalization of these life-changing ideas.

The full book will include all the material that you would receive if you took a standard Agile/scrum certification class for $1,000–$1,500. It also includes the stuff that you can't find in those courses. For example, my first instructor was fantastic, but when I asked him how to apply Scrum to non-software environ-

ments like marketing, his response was, "I don't know." It wasn't that he was ignorant of things he should have known, but that the Agile world in general is so IT-centric that it has little interest in other disciplines. There are many companies using Agile for areas of their companies other than software, but those are the exceptions led by people like me who dove a little deeper to understand why Agile works and then how to implement those principles elsewhere. While I may present my material at times as if I'm the only person in the world with this knowledge, there are plenty of capable people who have independently discovered the same things that I have. I'll present some stories of these business leaders.

The metaphors, stories, and analogies I use to present ideas, explanations, and their application come from a very broad variety of sources, ranging from my own to personal experiences to real stories from history, jokes, scientific studies, business cases, addresses from the world's greatest minds, and poems from diverse sources. I hope to prove that since these are universally applicable principles, wildly disparate types of content from eclectic and broad sources should combine to reinforce and deepen your understanding without contradiction. Any short-termed or overhyped business gimmick could not pass such a test.

Introduction to Section 1

This section has multiples purposes. The three chapters contained herein are very different: respectively, a historical narrative, a business case study and an introductory review of why you should consider Agile. I've opted to present the stories and topics in these chapters without any embedded Agile analysis or hints such as, "Remember this detail for later!"

We have plenty of space later where we'll refer back to some specifics in these. I want you all to read these first two chapters in this section without preparation to allow you to make your own conclusions. I'll throw my stuff at you in the subsequent sections. The third chapter makes the general case for Agile without diving in too deeply or comparing/contrasting the two previous chapters. Together, these chapters provide the foundation for the remainder of the book, and provide particularly deep wells from which we can drink deeply as we dive into the concepts in earnest. Some of these examples will be applied in a metaphoric way while we'll use others very literally.

During these first two chapters, I request that you ask yourself questions such as:

- Why did he include these details?
- Does this apply to my past or current challenges?
- Have I been in situations like that?
- What can I learn from that?

If we were all together in a small group, I'd like to present this first section of information to you informally, discuss it, and enjoy where the conversation takes us. I expect that you'll make many of the same conclusions that I have, however I suspect that many of you would have additional insights and applications that I haven't discovered. That's why I love teaching environments so much: I get to present some information, and through discussion walk away with more than I brought.

This section is my attempt to create that mutual learning scenario without us being in same location. I haven't yet laid my proposals, suggestions, theories and instructions. You can enter this section without any limitation on how you analyze its contents. I hope before you start reading the subsequent sections, you will have already formed some hypotheses, conclusions and strong

opinions on how to get more out of your business or organization. That way you'll be much more engaged has I present information, and you will be much better prepared to evaluate my stuff and decide how much of it you accept. Even if you completely disagree with me, my belief is that you'll find value in how to make life better for yourself, your company and those around you.

I hope that in the first two chapters, which are extended narratives, you'll be able get the recognize the ideas without any explanations or definitions so that you can instinctually recognize whether something is Agile or not.

I'll give you a few hints. Being "flexible" by pushing out a prioritized piece of work to accommodate managers' last-minute requests for information is not Agile. Agile includes flexibility, but being completely flexible about the important stuff is more wishy-washy than principled. An organization is Agile if it distributes accountability and decision making while aligned through a well-understood mission and set of objectives. Non-Agile organizations tend to be more command-and-control in operation with (a) more hypocritical managers than leaders, (b) putting a high value on sticking to a plan, (c) spending too much energy in bureaucracy, (d) blaming others and giving excuses, and (e) confusing the urgent for the important.

Chapter 1

Neptune

This chapter will describe Operation Neptune, the airborne component to the D-Day invasion of Nazi Europe by the Allies in World War II. While a big fan of history, I'm not claiming to be an expert on this event. To write a useful overview, I'll lean (pun intended) primarily on the fantastically detailed book, "If Chaos Reigns: The Near-Disaster and Ultimate Triumph of the Allied Airborne Forces on D-Day, June 6, 1944" by Flint Whitlock, with supporting details from other sources.

Background

On 4 June 1940, Nazi Germany expelled the bulk of Allied forces from the European continent at the Battle of Dunkirk. About 350,000 British, French, Dutch, Polish, and Belgian troops were evacuated by military and civilian ships. In their retreat, they left behind supplies, weapons, equipment, vehicles, ammunition and any certainty on when they might return. Their departure point was only about 25 miles (40km) east of Calais, the closest point between Great Brittan and France. The Nazis had almost exactly four years to prepare for the Allies' return. Over the course of that time, Brittan survived an extensive bombing campaign by the Nazi Luftwaffe through determination and an innovative air strategy. Meanwhile, The Pearl Harbor attack and Germany's declaration of war forced the United States to enter the European war in December 1941.

Prior to being thrust into the war, America had begun to build up their military, but "the mass of officers and men lacked any sense of urgency."[1] America's military was divided into three primary branches with the air forces acting as a de facto fourth. The professional soldiers were busy optimizing and reorganizing their organizations and operations. They were completely riddled with handicaps, but oblivious to their poor situation.

The greatest obstacle was psychological— complacency still persisted! Even the fall of France in May 1940 failed to awaken us…to a full realization of danger.[2] Urgency came with Pearl

Harbor and forced some immediate changes to their operational practices. The first post-attack meeting at army headquarters included all echelons of leadership, abandoning typical channels of hierarchical communications. Urgency was just the beginning: the military needed far more than that to become an effective force to combat its Axis opponents. In Europe, they had to find a way to coordinate between their own organizations and those of its Allies. It started out as a mess of well-meaning leaders caught in a confusing entanglement of infrastructure, command authority and communication barriers. Writing of the efforts to unify and combine efforts with those headquartered in the United Kingdom, Eisenhower wrote:

> The revolutionary transformation of America was not achieved overnight; the fact that it was ever achieved at all was due to the existence of staunch allies and our own distance from the scene of combat. At the outset none of us could foresee the end of the struggle; few of us saw eye to eye on what was demanded of us as individuals and as a nation; but each began, step by step, to learn and to perform his allotted task.
>
> America's transformation, in three years, from a situation of appalling danger to unparalleled might in battle was one of the two miracles that brought [victory in Europe] on May 7, 1945. The other was the development, over the same period, of near perfection in allied conduct of war operations. History testifies to the ineptitude of coalitions in waging war. Allied failures have been so numerous and their inexcusable blunders so common that professional soldiers had long discounted the possibility of effective allied action unless available resources were so great as to assure victory by inundation. Even Napoleon's reputation as a brilliant military leader suffered when students in staff colleges came to realize that he always fought against coalitions— and therefore against divided counsels and diverse political, economic, and military interests.
>
> Primarily the Allied task was to utilize the resources of two great nations with the decisiveness of single authority…
>
> The true history of the war, and more especially the history of the operations Torch and Overlord, in the Mediterra-

> nean and northwest Europe, is the story of a unity produced on the basis of this voluntary co-operation…
>
> But even the rapid growth of the Army and the latest manifestations of Axis military power had not jolted some Regular officers out of their rigid devotion to obsolete tenets and routine. For their blindness there was no longer an acceptable excuse.[3]

While the Allies were preparing to "liberate" Europe, the Nazis built extensive reinforced coastal defenses including what came to be called "The Atlantic Wall." They logically expected that any Allied pushback onto the continent would occur in the Calais area of France, and they put extra effort into hardening and defending that region.

The airborne component of the eventual Allied invasion of France was called Operation Neptune. Neptune was the Roman version of Poseidon; the mythological god of the ocean. I wasn't able to find any reference as to why the airborne assault was named after a sea-based name. Maybe it was a bit of misdirection should the name be discovered by the enemy. Maybe in the early stages there were three components that related to Neptune's triple-pronged trident. Maybe it was a name that was randomly selected by military intelligence. I suppose it doesn't matter as long as it provided operational security. It would be much harder to keep it a secret if they had called it "Operation Drop More than 100,000 Troops behind the lines in Normandy." It was planned in conjunction with and support of Operation Overlord for early June of 1944. The origins of Neptune began many years earlier, and developed in several unexpected ways. We'll start there.

Glider designs go back at least as far as Leonardo de Vinci. The Wright Brothers' first airplane was just a modified glider. So, when the WW1-ending Treaty of Versailles placed severe limitations upon the German's ability to build and run a modern air force, they cunningly turned to gliders as a loophole-way to train pilots for future use.

The successful use of parachutes date back to the late 18th century. Jumping out of balloons may have only been for spectacle and recreation, but the visionary Benjamin Franklin foresaw a different application: "…ten thousand men descending from the

clouds might…do an infinite deal of mischief before a force could be brought together to repel them."[4]

Perhaps it was because their paranoia of invasion or being outflanked in a battle across their broad expanses that motivated the Russians to pioneer military parachuting, with the first large training jump in history taking place in 1927. Stalin continued expanding the program. In 1936, The Soviets demonstrated in a dramatic way how to capitalize on the use of air transport to take men into battle. "The Kiev drop perhaps didn't rank with the invention of either the machine-gun or the tank, but it added a new dimension."[5] The drop of more than five thousand paratroopers was observed by representatives of several countries, but the Soviet Socialists' show made the biggest impression on their friends, the National Socialists of Germany.

Nazi German invaded Norway beginning on April 9, 1940. Norway had been neutral, but Hitler wanted its ports to flank Britain and try to control the North Atlantic. In combination with a simultaneous invasion of Denmark, this move was the precursor step to set up their drive into the West. Germany used paratroopers in both attacks. The attack on Norway was:

> …history's first combined military assault by air, sea, and ground forces. With a single stroke, [it] introduced a wholly new and revolutionary idea to the conduct of warfare—the concept of "vertical envelopment." For the first time, troops could be delivered to a battlefield and inserted either behind enemy lines or on top of any object. Suddenly the traditional, age-old horizontal movement of infantry units had been rendered, if not obsolete or irrelevant, at least incomplete.[6]

In coordination with Panzer tanks and infantry, paratroops were used in their big push which began the very next month on May 10th. The Allies referred to the German Paratroopers as "Green Devils."[7] With great speed, they moved through Holland, Belgium and Luxembourg, and from there into France. Glider-delivered troops were first used in battle in this phase, a concept created by Hitler himself. The attack on the Belgian garrison, Eben Emael, was probably the best demonstration of the potential of this new tactic.

Many thought that Eben Emael was so fortified as to be invincible. It was built in the early 1930s specifically to deter any future German attack. When completed, it was claimed it was the largest steel-reinforced concrete fortress in the world. They built it into the side of a cliff 100 feet (30.5 meters) above the Albert Canal. They excavated the hill so it could be entirely underground. The exterior walls and roofs were built thick enough to withstand bombs and artillery shells. It's gun turrets were placed to aim in the direction from where the Germans would come. The garrison housed one thousand men.

Early on May 10th, eleven German gliders with eighty-five men trained in demolitions "swooped down on the fortress and captured fourteen of its eighteen guns in twenty minutes."[8] This small group captured the entire force by the end of the following day. The gliders enabled less than one hundred troops to capture the impressive obstacle with its one thousand men in less than two days while suffering only 6 fatalities and 20 casualties. The Nazi General who commanded the airborne units called the victory "decisive."[9] The Allies must have viewed it as horrifying.

Preparations

In America, "on 25 April 1940, just two weeks after Germany's invasion of Norway and Denmark, the War department granted approval for the Army to form a 'test platoon' of parachutists at Fort Benning, Georgia"[10] at the Infantry School. Canada and the United Kingdom similarly started investigating Airborne military operations. They had never done it before, hence they were all learning as they trained. They shared information, plans and results with each other to accelerate the learning process. Each country did similar things, but also developed their own particular approaches.

The primary commonality is that they correctly anticipated that airborne troops had to be proficient in standard military skills in addition to those particular to airborne delivery and that only a small percentage of troops would meet the physicality, competency and psychological requirements. Each country accepted volunteers and kept only those who passed rigorous training and testing.

As Canadian military historian Brian Nolan writes, "Paratroopers are by nature a demonstrative lot. If jumping out of an airplane is not a theatrical act, then nothing is. As the army discovered early, there were certain traits that made a good jumper. Ironically, some of the attributes the army wanted in a paratrooper were diametrically opposite to those they looked for in an infantryman, artillery gunner or tank crewman. What set a paratrooper apart from his fellow soldiers was his ability to think on his own and be decisive in his actions…. It was crucial to have the ability to deal with unusual situations and to remain calm when things began to go awry."[11] And, as will shortly be seen, this ability to make correct, independent decisions in the midst of the chaos and confusion of battle would often be the main factor between success and failure, victory and defeat, life and death.

THERE WERE NUMEROUS motivations that compelled men to volunteer for the paratroops, and they were the same whether the volunteers were Canadian, British, American, or German: adventure, the pride in joining an elite force, peer pressure, patriotism, the distinctive uniform, the extra pay, and, yes, even a chance to see combat. Some Canadian officers and non-commissioned officers volunteered regardless of the fact that they would be required to take a reduction in grade; majors and captains became second lieutenants, and sergeants reverted to privates. But, to most, loss of rank did not matter. What was important was that they could— if they were tough enough to pass the rigorous training program— hold their heads a little higher, stand a little straighter, wear the maroon beret, and show off the "Paratrooper" wings and insignia on their uniforms.

> … Reuben Cohen, a member of a tank unit stationed in Winnipeg…volunteered for the paratroops "because I did not take kindly to being in the turret of a tank; I found it too confining…. After I transferred, the extra pay [seventy-five cents a day] certainly came in handy, although I didn't know that the parachute corps offered jump pay when I joined.[12]

The training had multiple facets, and special training through experience—not just by lecture or demonstration--was a big part of the process. One Canadian volunteer that was sent to Fort Benning in Georgia for combined training said that upon arrival the

master sergeant met them three miles from the barracks and had them "double-time" it there, promising that any who fell behind would be sent home. Harry Reid explained, "This was lesson number one in not packing too much gear when you go somewhere. Be selective in what you think you need."[13]

In 1943, the Canadian Army published a training memo that listed the "Ten Commandments of Canadian Parachute Troops." Here they are:

1. You are the elite of the Canadian Army. For you action shall be the fulfillment and you must train yourself to stand every test.
2. Cultivate true comradeship, for together with your comrades you will triumph or die.
3. Be shy of speech and incorruptible. The strong act; the weak chatter, will bring you to the grave.
4. Calmness and caution, thoroughness and determination, valour and a relentless spirit of attack will make you superior when the test comes.
5. Face to face with the enemy, the most precious thing is ammunition. The man who fires aimlessly merely to reassure himself has no guts. He is a weakling and does not deserve the name "Paratrooper."
6. Never surrender. Your honour lies in victory or death.
7. Only with good weapons can you achieve success. Look after them therefore, on the principle, "First my weapons, then myself."
8. You must grasp the full meaning of each operation so that, even if your leader should fall, you can carry it out coolly and warily.
9. Fight chivalrously against an honourable foe; fifth columnists and civilian snipers deserve no quarter.
10. With your eyes open, keyed up to the highest pitch, agile as a greyhound, tough as leather, hard as steel, you will be the embodiment of a Canadian Paratrooper.[14]

It was interesting and a little unsettling when I noticed that the Germans had a very similar set of "commandments" for their paratroopers, the Fallschirmjäger. It appears that the Canadian list is a plagiaristic interpretation of its German counterpart with

many portions being direct quotes. The primary differences being the propaganda terminology and some cultural differences. For example, the German version of the 3rd commandment took a sexist approach with its noun usage in the second sentence saying, "Men act while women chatter."[15] Many might expect that they would want to differentiate themselves from their foe, but perhaps more about imitating what they saw was working in order to catch up. Without making any subjective judgements of the commandments themselves or their origination, it's clear that paratroopers were taught in both countries that should think and act differently than typical soldiers, such as the principles in #8, and have more success in doing so. This new approach to instilling these new warriors with commitment to objectives and freedom to use principles such as flexibility to accomplish them turned out to be the difference between victory and defeat.

The training was grueling and intensive. Physical conditioning, the fundamentals of parachuting, packing parachutes, jumping from progressively taller platforms, and then it was time to get the minimum five jumps from airplanes. They practiced jumping at various altitudes and conditions including night. The training extended to the commanding officers who many times demonstrated leadership by literally being the first out of the plane when a groups did their initial jumps.

The push-ups were the worst. Sergeant Earl Rice recalled, "The instructors used this as punishment for mistakes and would start with, 'Give me twenty-five, soldier!' or it could be fifty or a hundred. I did a hundred once, but only by sheer determination because the instructor was in front of me doing his hundred with one arm!"[16]

The breadth of training was daunting. They could be used in geographies as diverse as Northern Africa and Western France, but the inherently unpredictable situation in which they might find themselves required specialized preparations. Brigadier James Hill of the British 6th Airborne explained:

> "I made sure that every officer could do two jobs and this proved absolutely invaluable. Every battalion and company had an A and B Headquarters, so that if one was knocked out, the other could take over. All the soldiers were trained to use other people's weapons and to drive Bren carriers—

> anything that kept the battle going. My four rules of battle I rammed home: number one, speed— we had to get across country faster than anyone else; two, control— no good commanding unless you have discipline and control; three, simplicity (in thought and action); and four, effective fire power or fire effect."[17]

After D-Day, Spencer Wurst, an American paratroop squad leader discussed the flexibility that this type of training gave them during confusion of battle:

> I can still hear those gliders hitting the hedgerows, tearing off wings, smashing equipment, and mangling and killing the crews. We picked up eight of our sixteen [57mm anti-tank guns]…I suppose it miraculous we even got as many guns as we did. But often there was no crew left to operate them, and now we saw the value of the cross-training we had undertaken…because we sometimes had to man the 57s ourselves.[18]

The basic principles instilled in the troops were the same for each of the Allies, but many of the specific policies and tactics of the different countries differed. For example, the Americans paratroops departed their airplanes from a side door. The Brits and Canadians fell through a hole in the fuselage's floor. The designs of their gliders were different. The equipment and weapons they carried varied. The methods they used to pack their equipment was different: the American strapped everything to their bodies—up to or more than their body weight—but the Canadians use a large bag attached by a leash that they released just before landing on the ground. The British liked to practice by jumping from balloons. The countries had wildly different pay rates. I couldn't discern which, if any, customizations were superior. It appeared that all of these differences in the specifics had their plusses and minuses, but were suited for their different cultures.

Initial training and subsequent exercises proved to be very dangerous. Several men died when their chutes failed to open. Improved parachute designs helped, but jumping out of an airplane continued to be risky. One major died when a following aircraft damaged his chute. It's impossible to pinpoint the exact arrival locations for each paratrooper and many were injured or killed by unfortunate landings. Many casualties occurred while exiting the

aircraft, with body parts colliding with metal. There were incidents of high winds stripping the parachute right off the trooper. Aircraft collided midair. Equipment and human failure caused the crash of airplanes and gliders. A glider's tow-rope detached at takeoff causing a catastrophic crash killing one of the Brit's key leaders, Colonel John Rock. In the worst training disaster, thirty thousand men participated in a D-Day dress rehearsal in southern England. More than 900 of them were killed because of chance incursion of German torpedo boats from the sea and friendly fire from the shore. This exercise, Tiger, was kept confidential for about thirty years.

After months of training in America, Canada and England, these teams were ready for action. The total Allied Airborne forces consisted of:

- US 82nd division led by Major General Mathew Ridgway, nicknamed the "All Americans"
- US 101st division led by Major General William Lee, nicknamed the "Screaming Eagles"
- British 6th Airborne Division and Canadian parachute battalion led by Major General Richard Gale, nicknamed the "Red Devils"

Harry Reid commented on their readiness with this confident evaluation: "Our jump training was all perfection and beyond, I might say. There was a slogan that 'The possible we do immediately; the impossible takes just a little bit longer.' We had to learn to cope with the impossible. Mental alertness was the first phase of parachute training. The glory seekers were weeded out quite promptly."[19] It was time to test that "perfect" training in the real war.

Mobilizations

Early in the process, the British decided to see if one of the new airborne units could succeed in a combat mission. The mission was called Operation Colossus and occurred in early February 1941 in the Apulia province of Italy. The plan was for the men to attack the Tragino aqueduct to cut off the water supply for military bases and civilians in the region.

The lieutenant colonel only needed a few to participate. He asked for volunteers for this expectedly suicidal mission from his group of 500 men. All of them asked to go. 35 were selected and began six weeks of preparation, working with a full-scale replica of the aqueduct that was built for them. One man died during training. Those who were involved in the operation were all captured by the Italians.

While the action was spun into a public relations success, the actual mission was a multi-point failure:

- One of the six planes dropped its men in the wrong valley, far enough away to never reach their objective.
- The remainder did get to the objective, but with less explosives, the damage they created wasn't catastrophic, requiring only a week of work to repair it.
- The paratroopers hiked about 50 miles (80 kilometers) to a rendezvous point where they expected to be taken away by a submarine, however the sub didn't go to the appointed location because it had been determined that spot wasn't safe. There wasn't any way for them to tell the paratroopers.

It was fortunate that the men were held as prisoners of war and not executed. The failure did serve the progress of the Allies airborne preparations: these few days of experience gave them valuable lessons they hadn't learned—nor couldn't have—through more than a year of intensive training and practicing.[20]

In the spring of 1941, the Nazis advanced through Yugoslavia quickly, but ran into some difficulties in Greece. They defeated the remaining British forces there in late April by blocking their retreat with a drop of gliders followed up with paratroopers from 200 aircraft.

They next planned to capture Crete even though it was heavily fortified. Crete was just too strategically appealing. Its airfields could be used to attack Romania, Palestine, Egypt and North Africa. Its harbor could be converted into a valuable Nazi naval base. Their plan was to replicate their victory over Eben Emael using paratroops and gliders to capture the British garrison and the remainder of the island. They named it Operation Mercury. Perhaps I spend too much time trying to decipher the code name that these militaries used, but with their track record and a name

like Mercury it sounds to me like they expected everything to be completed quickly and easily, just like their previous expeditions.

The attack started on May 20, 1941. They dropped 15,000 paratroops from 500 aircraft, and landed 74 gliders. The island was captured in two weeks. It was a complete victory, giving Hitler the advantages he wanted, all while damaging or sinking 20 sea vessels, killing more than 4,0000 troops, and capturing more than 15,000 prisoners. "With four thousand [Germans] killed and missing, of whom half were paratroopers killed on the first day, to say nothing of the 350 aircraft destroyed, it was their bloodiest experience in the whole of the Second World War up until that point."[21]

Except for limited paratroop drops, such as to strengthen the lines at Leningrad, Germany stopped large-scale actions using paratroops and gliders. Two months after Mercury, Hitler met with General Student and told him, "Of course you know, General, that we shall never do another airborne operation. The day of the parachutist is over. The parachute arm is a surprise weapon, and without the element of surprise there can be no future for airborne forces."[22]

Hitler's negative assessment of the Crete victory, even though airborne contingent was instrumental to achieving it, may have been because he was comparing the numbers against the relative absence of casualties in previous victories. It may have been because of his enormous need for personnel and equipment for the following month's Operation Barbarossa, the invasion of the Soviet Union. While we don't know exactly why he made this decision, we do know that while, in victory, the Nazis' valuation of large-scale, combined glider and paratrooper operations dropped (very bad pun), in defeat, the Allies' valuation of such capabilities took off (my last pun, I promise).

Interestingly, about the time the Germans decided that the losses suffered by their airborne and glider troops were more than they could bear, the Americans and British were going full steam ahead to adopt the principles and strategies of airborne and glider warfare…Wars are won or lost on such decisions.

Seeing the Germans' success in Crete, however, and not knowing that the Germans had permanently abandoned the paratroop/

glider concept, the British redoubled their efforts to create an effective airborne fighting force. Soon, so would the Americans.[23]

The British attempted another airborne small mission in early 1942. The Nazis had built a series of strange installations of large equipment along the French coast, the purpose of which wasn't understood. Many scientists believed that these things were being used to reduce the effectiveness RAF bombing missions. They measured pulsed transmissions across the channel at 570Mhz, but didn't understand the purpose. The scientists wanted to examine the particular equipment's technology back in their own labs. Aerial reconnaissance showed a building that was set back from the cliff, with a black object that appeared to be a parabolic antenna positioned right on its edge pointing to the sea.[24]

Operation Biting included a period of intense training and planning before execution occurred on the night of February 27, 1942. Major Jon Frost took only one company of men, and dropped into France a few miles from the target. They attacked the villa, killing several of the guards and capturing the installation. They removed a few of the important pieces of the equipment. Another skirmish was necessary to eliminate sentries on the beach so that they could be picked up by boats that returned them to England with their booty.

This raid was a big success, yet of their small group 2 were killed, 6 wounded and 6 missing. They acquired the equipment they wanted and a captured technician for what turned out to be RADAR. The apparatus and information from this operation allowed the scientists to create countermeasures to mitigate much of the German advances in RADAR technology.

The successes of these two small raids were encouraging. They did realize, however, that extrapolating the lessons they learned from these tiny incursions to large-scale invasions would be difficult.

The first major combined combat operations with involving the Americans and British commenced November 8, 1942 as the Allies invaded Northern Africa with coordinated attacks in Morocco and Algeria. The flights for the American 509th Parachute Infantry Regiment took off in England and flew all the way to Africa across Spain with several of the C-47s becoming widely scattered. Despite the difficulties, they were successful in cap-

turing their objectives. The British 1st Parachute Brigade had a much shorter flight, from Gibraltar, and were dropped on target in time to capture and hold a key airfield. These units moved east in coordination with other Allied forces, and were air-dropped as Allies crossed into Tunisia. All the airborne groups were successful in heavy combat throughout the campaign, but they did suffer significant losses.

This was another learning experience, in size/complexity, coordination and duration of engagement. One major from the 509th complained that the US Army was "incredibly naïve" in its lack of detailed planning, proper training and equipment for the troops. The issue was that there wasn't enough attention given to what to do after the initial activities. They hadn't considered an orderly procession of drops selecting objects ahead of the advancing ground troops.[25]

While Torch was still underway, the British launched another small operation called Freshman. This was the first time that Allied gliders were used in combat. The objective was the Nazi heavy water facility 60 miles (97km) north of Oslo, Norway. Only two gliders were towed into Norwegian airspace and released. Both crashed. It may have been because they had to fly without engines through a blizzard. Those men that survived the crashes were captured, interrogated and executed.

The African campaign ended in May 1943. Eisenhower turned his attention to Italy. The first stop was Sicily. This was called Operation Husky, and was scheduled for July 9, 1943. The initial invasion included "3,200 ships, 4,000 aircraft, and some 181,000 men. It...also mark[ed] the first time that British and American parachute and glider forces would take part together in a major operation."[26]

Though Sicily was captured, the vertical invasion portion was a failure. This was by far the most complicated combination of gliders and paratroopers from the British and Americans to that point. The list of individual breakdowns was sad:

- 144 British gliders were released too soon, so that 69 of them couldn't even reach the land, with hundreds drowning. Of the other 75 gliders, only 12 arrived at the right locations. If you're keeping score, that's only an 8% success rate. 600 men were casualties.

- 23 of the 266 American transport aircraft were shot down by the US Navy when gunners misidentified them as German or Italian. 229 men died by this "friendly fire."
- Friendly fire claimed more victims two days later, allowing only 39 of the 127 C-47 transports to get within one mile of their drop zone.

Following the seaborne invasion of North Africa in November 1942, the 82nd prepared to make its first combat jump, Sicily. [Colonel James] Gavin was, as was his custom, the first man out of his plane. Despite the scattered nature of the drop and the U.S. Navy's accidental shooting of numerous transport planes carrying the 82nd, Gavin felt that the jump and the battles that followed hardened his men into highly capable veterans, and he was anxious to employ them when it came time for the invasion of continental Europe.

Dwayne Burns wrote that Gavin was popular with his troops, "not just because he conducted his command from the lead position but because he was also a jump school student from Fort Benning. He earned his wings like the rest of us and had full rights to be called a paratrooper. We didn't call him 'Jumpin' Jim' for nothing."[27]

Sicily was captured in just over a month, but the airborne contingent wasn't a significant factor. The failures demonstrated the dangers of airborne and glider operations. The question had to be if the potential value was worth the risk. Jumpin' Jim may have been convinced they were capable of success in a far more complicated invasion of France, but this wasn't obvious to everyone. Thus far in the war, the Allies had witnessed the potential, but their own results were mixed.

Preparing for D-Day

The preliminary planning for what became Operations Overlord and Neptune began in 1943 with British Lieutenant General Frederick Morgan and his staff. He was in a temporary leadership position of Chief of Staff for Allied command, and as such was cognizant that while his role was important he had limited authority to make binding decisions for long-term actions. He and his staff coordinated all the research activities. "He did not

want to tie the future Supreme Commander—whomever it might be—to some rigid cast-in-concreate plan."[28] General Eisenhower was appointed Supreme Commander in December 1943. "Once Ike arrived on the job, planning and preparation for the invasion swung into high gear. Meetings, arguments, and decisions on how many troops, tanks, trucks, tires, bombs, bullets, bulldozers, bandages, planes, maps, gallons of fuel, tons of rations, and mountains of other supplies went on non-stop."[29]

After extensive deliberation, Eisenhower and his team (organized with the name SHAEF for Supreme Headquarters Allied Expeditionary Force) selected North-eastern shore of the Cotentin Peninsula in Normandy as the insertion point. This area is about 120 miles (193km) from Portsmouth in Southern England. The American 101st and 82nd and British 6th Airborne divisions would land behind the lines first in the night. After the paratroopers arrived they would receive equipment and reinforcements by air via gliders and eventually by sea via landings on a 50 mile (80km) stretch of beaches codenamed (from west to east) Omaha, Utah, Gold, June and Sword. The complexity of this proposed operation was enormous. The planned details changed often. Years later, Eisenhower explained his approach to process this way, "In preparing for battle, I have always found that plans are useless but planning is indispensable."[30] As time passed, the objectives of the operations began to be defined and prioritized. After that, they worked to identify the best way to accomplish these.

> It was the town of Sainte-Mère-Église, roughly halfway between Montebourg and Carantan that had caught the eye of American military planners…Control Sainte-Mère-Église and you control the Cotentin [peninsula]. No fewer than five roads pass through it, plus it was only seven miles from the westernmost amphibious landing beach known as Utah. Drop an airborne division or two— along with their glider-infantry regiments— into the area and you stood a good chance of preventing German reinforcements from Cherbourg in the north and Brittany in the west from slamming into the troops coming ashore at Utah. The western end of the sixty-mile-long beachhead that ran from La Madeleine to Ouistre-ham would thus be secure and the seaborne troops

> could move inland after overcoming local German opposition. Yes, Sainte-Mère-Église would definitely have to be taken in the early hours of D-Day.[31]

Two other key objectives were the capture of bridges over the Orne River to the East near Caen, and the destruction of the Merville Battery whose big guns could reach Sword beach. These were assigned to the British 6th. After the significant but smaller scale actions in Africa and Italy, this invasion was a big gamble with more than 150,000 men, hundreds of aircraft and thousands of ships. It was the largest air/sea invasion in the history of the world. It was planned to be the most significant event to end the largest war in the history of the world. With all potential costs and benefits of this event in the balance, the leaders and planners had to consider and reconsider all the variables and priorities. They also had to take into account all the things they learned from the previous operations, what worked and what didn't—and why. The objectives I mentioned above were a sampling of the things they had to achieve for the overall mission or goal of the invasion to be realized.

Training continued, but now with more focus on the situations that the troops would see in the operation. These exercises also incorporated tactics to mitigate previous failures. While secrecy prevented the enlisted and most of the officers from knowing where and when the actions would occur, they could make some guesses as to what they would be asked to do by the exercises in which they participated. They had a brigade-level maneuver at night designed to test, "the effectiveness of small units separated from the main force during a simulated drop."[32] Another experiment was set up to see if 1,370 paratroopers could all exit their planes within five minutes then clear out of the area within fifteen of landing.

The German High Command was convinced that the Allies would attack at Calais and that their most feared general, Patton, would be leading them. To reinforce that opinion, the Allies put Patton in a camp in East Anglia, exactly were a Calais invasion force would be stationed. Only this camp was set up, in part, by special-effects people from the Shepperton Film Studios. It included empty tents, inflatable rubber tank, fake ammunition depots and imitation fuel dumps. They threw in some deceptive

radio transmissions and used an imitator pretending to be Field Marshall Montgomery in far off locations to convince spies he was anywhere but in England preparing for the real invasion.

Secrecy of the actual planning details were paramount. Code words and deceptive activities were just the start. The vast majority of the participants didn't learn the details until just days before their departure when they had been moved to sequestered staging areas. The tension and anxiety of the men increased as they realized that the time was close for departure.

Eisenhower wrote about the relationship between senior leaders and the men during the preparatory period:

> Senior commanders used every possible moment in visiting and inspecting troops. Records left by a staff officer show that in four months, from February 1 to June 1, I visited twenty-six divisions, twenty-four airfields, five ships of war, and numerous depots, shops, hospitals, and other important installations. Bradley, Montgomery, Spaatz, and Tedder maintained similar schedules. Such visits, sandwiched between a seemingly endless series of conferences and staff meetings, were necessary and highly valuable.
>
> Soldiers like to see the men who are directing operations; they properly resent any indication of neglect or indifference to them on the part of their commanders and invariably interpret a visit, even a brief one, as evidence of the commander's concern for them. Diffidence or modesty must never blind the commander to his duty of showing himself to his men, of speaking to them, of mingling with them to the extent of physical limitations. It pays big dividends in terms of morale, and morale, given rough equality in other things, is supreme on the battlefield.[33]

Mr. Whitlock observed, "Studying past operational failures has always been one way the military has found future success."[34] The two primary issues were getting the troops to the right location and minimizing friendly fire and other issues with misidentification. These evaluations led to several innovations. I'll mention just five.

SHAEF identified a recurring problem in previous operations. Troops were often dropped in the wrong places, sometimes too

far away their designated drop zones (DZs) to find their way back in time to make a difference. It was critical for the airplanes flying over a dark French night to recognize their DZs so the paratroopers could exit at the right time to land where they needed to be. Similarly, gliders were especially vulnerable to mistaking their landing zones LZs, because after being released from their tow craft they had only limited choices on where to land. They didn't get the chance to pull up, circle around and try again if things weren't lined up just right.

The solution to minimizing these issues was the creation of small teams called Pathfinders. These specially trained men were to be delivered prior to the invasion and mark the DZs for the pilots using special equipment that could be recognized by the Allies and invisible to the Nazis. Depending upon your point of view, these volunteers were either the "elite within an elite" or the "doomed within the endangered." These few men had what many considered the most dangerous and important role in the invasion. Each division had only one pathfinder team.

The specially-designed radio beacon created for the patherfinders was called an AN/PPN-1A, generally referred to as a "Eureka." It was seventy-five pounds built into a pack so that one pathfinder could jump with it and carry it to the right location. The Eureka's counterpart on the aircraft was a "Rebecca." Through a simple handshaking protocol between the Rebeccas and Eurekas, the aircraft navigator could compute the distance to the right DZ. The Eurekas were also equipped with a self-destruct feature that pathfinders could use to keep them out of enemy hands. Each eighteen-man pathfinder team had two Eurekas. Another radio beacon, the AN/UPN-1, was brought in by each team. This one was twenty-five pounds heavier. It too worked with corresponding equipment on inbound aircraft. Its job was simpler: to mark the center navigational point for each of the divisions. They also carried an assortment of other signaling equipment: colored panels for daylight recognition, pole-mounted flashlights to help paratroopers find assembly locations, signal lamps for sending messages in Morse Code, high intensity lights to signal pilots, car-battery-powered lights with interchangeable colored lenses to mark drop zones (each regiment had a different color).

For the 101st, the job of briefing the pathfinders was assigned to Sergeant Hugh Nibley. He recalled:

> "All these boys I briefed had the same question. It was very sad. They said, 'Have we got any chance of survival?' It was sad because they were so eager to know what chances they had, which is fair enough for them to ask, but some of them, like the pathfinders, didn't have a prayer. They were practically suicide missions, and we knew it was going to be bad business…. We couldn't reassure them, or anything like that."[35]

Once it was time to give the details over to the men, they were shown timetables, lists of objectives and maps. They were also shown sand tables which were miniature models of the region a group was to make their initial landing. It showed the terrain in three dimensions including little trees, fences and buildings. The tables were kept in closed tents and those who needed to know were brought in to see in small groups. They were to memorize it as best they could. These weren't new to military planning, and perceived value of them varied. Staff Sergeant Roy Howard, a glider pilot, was impressed with the detail calling his, "a most marvelous sand table, a perfect model of what was on the ground in Normandy even down to the last tree and ditch."[36] While a medic named Thomas said, "I didn't pay all that much attention. I had been in the airborne long enough to know that night jumps never went off as planned."[37] The big innovation was when someone had the great idea of using a movie camera with a table. He moved the camera so that it imitated the approach the landing glider should take. This meant that a pilot could see a movie showing him what he should see out of his cockpit. Perhaps it was the world's first flight simulator.

The difficulty of identifying ally from enemy in battle, especially in tight quarters and in the dark on the ground was reduced by low-tech solutions. Paratroopers 101st were given toy metal frogs typically given away at shoe stores that make clicking noises. These "clickers" were often called crickets. A single click was answered by two clicks of a fellow Screaming Eagle. Some British regiments used bird whistles and duck noise makers for identification. The 101st also painted playing card symbols on their helmets

with each of the regiments receiving a different suit. For example, the 501st had white diamonds. Verbal challenge words were used by all of the invading force. The word "flash" was to be responded to by "thunder." These were chosen because it was difficult for Germans to pronounce them. Anyone on the battlefield that yelled "halt" was to be shot without any further investigation.

Hours before their departure, American troops, "watched as ground crews at the aerodrome finished swabbing thick black-and-white bands around the wings and fuselages. [They were] told that this was being done as a method of identification; nobody wanted American planes being shot down again by American gunners as had happened over Sicily."[38]

D-Day had been set for Jun 5, 1944. A week before that Eisenhower's Chief Air Marshal, Trafford Leigh-Mallory went in to General Eisenhower and warned him that Operation Neptune would be a "'futile slaughter' of two fine divisions."[39] He claimed that conditions on the western region where the Americans were to land were too dangerous because of new intelligence about the expected Nazi strength there and the unsuitable LZs. His warnings had to be fully considered because, according to Ike himself, "Leigh-Mallory was, of course, earnestly sincere. He was noted for personal courage and was merely giving me, as was his duty, his frank convictions."[40]

Leigh-Mallory was the man on Ike's staff responsible for all Allied air forces. He had thirty years of experience air force training, operations, and leadership. Ike's background was in infantry and armor. Ike went to General Omar Bradley who was responsible for ground operation in the area where the 82nd and 101st were to land. His opinion was that while very risky, they were necessary to the overall success of the mission, saying, "Certainly I would not willingly risk the lives of 17,000 airborne troops if we could accomplish our mission without them. But I would willingly risk them to insure against failure of the invasion."[41] With those two opinions, Eisenhower reasoned that if it was too risky to use the American airborne divisions then the entire operation was "foolhardiness, that presaged a gigantic failure, possibly Allied defeat in Europe.[42] The weight of the decision must have been enormous, but he knew he had to make it himself. He decided that based upon his review of past experiences using airborne

under his command and his assessment of their planning that the invasion would proceed. He called Leigh-Mallory to tell him his decision. His reasoning was high-level and strategic based on his judgement: (a) without the airborne assistance, the American portion of the invasion was at high risk of failure; (b) without the American portion of the forces landing safely in Normandy the invasion would fail; and thus (c) their mission of liberating Europe would fail. Since Eisenhower was devoted to the mission, he had to follow-though with the initiative that best supported one of his objectives.

At about this time, Eisenhower sent out the following flyers to the combined Allied forces:

> Soldiers, Sailors, and Airmen of the Allied Expeditionary Force!
>
> You are about to embark upon the Great Crusade, toward which we have striven these many months. The eyes of the world are upon you. The hopes and prayers of liberty-loving people everywhere march with you. In company with our brave Allies and brothers-in-arms on other Fronts, you will bring about the destruction of the German war machine, the elimination of Nazi tyranny over the oppressed peoples of Europe, and security for ourselves in a free world.
>
> Your task will not be an easy one. Your enemy is well trained, well equipped, and battle-hardened. He will fight savagely.
>
> But this is the year 1944! Much has happened since the Nazi triumphs of 1940– 41. The United Nations have inflicted upon the Germans great defeats, in open battle, man-to-man. Our air offensive has seriously reduced their strength in the air and their capacity to wage war on the ground. Our Home Fronts have given us an overwhelming superiority in weapons and munitions of war, and placed at our disposal great reserves of trained fighting men. The tide has turned! The free men of the world are marching together to Victory!
>
> I have full confidence in your courage, devotion to duty, and skill in battle. We will accept nothing less than full Victory!
>
> Good luck! And let us beseech the blessing of Almighty God upon this great and noble undertaking.[43]

The final preparations had to do with checking the weather reports. They were bad. On June 4th, the day before the planned attack, at a 4am briefing, the head meteorologist, RAF Group Captain Stagg, told SHAEF that a powerful storm was coming at them high winds and waves that could make a disaster of everything. Their mobilization was already underway. The pathfinders were already in France so any delay would increase the likelihood of them being found and their efforts wasted. Many ships had left their ports. The airborne troops were preparing their gear. A delay at this point could jeopardize their operational security. Without surprise, their chances of success were dramatically reduced. The commanders were split on what to do. The current weather forecasts showed a succession of storm that meant that any delay could turn into a delay of up to two weeks. Again, it was up to Eisenhower to make a decision. He chose to put everything on hold. They'd continue to review updated forecasts twice a day. The storm hit as expected on time with the predicted intensity.

At 3:30am the following day, Ike began his drive through near-hurricane conditions to the forecast meeting at the naval headquarters scheduled for 4am. Of the drive, he wrote, "It was anything but a cheerful one." Stagg started by confirming that conditions at that moment on Normandy beaches were horrible and would have crushed their plans had they gone ahead. He then gave the group "an astonishing declaration." He forecasted a thirty-six-hour break in the weather starting the following morning. If correct, the issue was whether one day and a half would give them enough of a time window for the invasion force to land, make progress and get reinforcements and supplies to shore before the weather got worse again. If incorrect, it could be disaster. Then again, waiting would be costly also. There didn't seem to be any safe decision. By 4:15am, Eisenhower decided to move forward. D-day was set for June 6, less than 24 hours away. Ike described what happened immediately afterward, "without a further word, each [of his staff] went off to his respective post of duty to flash out to his command the messages that would set the whole host in motion."[44]

Operation Neptune

Back in May, the French under-ground reported that three German divisions, including the 91st Air-landing Division (designed to counter-attack airborne and glider invasions) had just been moved into the Cotentin Peninsula to strengthen defenses around Cherboug. These new forces were now positioned exactly where SHAEF planned to drop the 82nd. So, on May 26th Generals Ridgeway, Bradley and Taylor revised their planning. They moved the DZs near the Merderet River, closer to the beaches to avoid their troops from getting cut off and isolated. They were to be dropped north of the 101st and within striking distance of Utah beach. Their objectives were to:

- Capture and control the general area of their landing
- Capture the town of Sainte-Mère-Église, which had the key crossroads, and guard against any counter attack
- Capture the crossings of the Merderet River and a bridgehead covering them
- Destroy some of bridges over the Douve River and capture others
- Protect the Northwest flank
- Be prepared to advance to the West

The 101st was to provide support to Omaha Beach and capture the town of Carentan, with its roads and railway, along with several secondary objectives. The objectives of the 82nd and 6th Divisions were similarly challenging. The above details demonstrate the importance and complexity of the division's responsibilities, all redefined about a week before departure. These objectives were supposed to be accomplished within 2 days. The leadership split divisions up into three groups so that each could focus on a limited number of objectives.

Only days before the invasion, Sergeant Nibley was told, "…you have to take the [general's] jeep over by sea because General Pratt wants your place on the glider."[45] His seat to be taken by General Pratt was the copilot seat in the first glider to land. He learned that his ship led the convoy and his jeep was assigned to be the first launched by that ship. Nibley drove off to the staging area in Wales to waterproof the jeep. He coated the engine with creo-

sote tar and attached a tall pipe to the carburetor so the engine could still run even when completely submerged. Finally, he put sandbags in the jeep to weigh it down so that its tires would have traction in the wet sand so they had a chance of emerging from the waves on dry ground. He went from being the first to arrive by glider to the first by jeep. Meanwhile, General Pratt was "tickled as a schoolboy when it was decided to permit him to enter the combat area by glider."[46]

Similar to Pratt, Major General Ridgeway, the commanding general of the entire 82nd wanted to be right at the front of the action. He opted to parachute into Normandy. Lieutenant Colonel Mark Alexander noted, "He said, 'I want to be there on the ground right from the start, and I want you to pick a plane for me where I'll have the best chance of landing on the drop zone.' We were the only combat-seasoned regiment that was jumping into Normandy. He knew we gave him the best chance of getting on the ground in the right place…"[47]

Several people without military tasks asked Ike for permission to go in the supporting ships to watch the attack. They all had justifications why they should go, however Eisenhower had determined who he wanted to be where to maximize the success of the operation, and have senior leaders back where they could contribute the best. It appears that they had a mix of curiosity, a desire to know sooner the outcome than waiting back in England for reports, and perhaps the thought that should things go wrong they might step in and issue some orders of their own. Eisenhower was sympathetic about the former reason. He too would be back in England waiting. The foremost of these individuals asking to go was Prime Minister Churchill. Ike refused his request on three grounds: (1) should the prime minister be injured or killed it would be a setback to the unified leadership, (2) it would add to Eisenhower's personal burden that was already overwhelming, and (3) it undermined his command perceived by the troops and the leadership. Churchill found a loophole, saying that while the general had control over the entire expeditionary force, he did not have control over composition of any particular British ship. Yet, Churchill did not go because the King intervened to prevent him.

Eisenhower visited Portsmouth mid-day on June 5th to watch the British troops loaded into their landing craft. They cheered

him. Later, he drove the fifty miles (80 KM) to the airfield from which the 101st would take off. His driver said that the troops began cheering and whistling when he stepped out of the car. "Everyone went crazy," she said. "The roar was unbelievable…. There they were, these young paratroopers in their bulky combat kits with their faces blackened so that they would be invisible in the dark of the French midnight…. They looked so young and brave. I stood by the car and watched as the General walked among them…. He went from group to group and shook hands with as many men as he could. He spoke a few words to every man as he shook his hand, and he looked the man in the eye as he wished him success. 'It's very hard really to look a soldier in the eye,' he told me later, 'when you fear that you are sending him to his death.'"[48] To his driver, Ike said, "I hope to God I know what I'm doing."[49] Chaplain Sampson noted, "[Ike] was gambling with the lives of these fine young men; he knew it and they knew it, but it was O.K. with them. They were ready and willing to vindicate his judgment."[50]

Eisenhower wrote the following of that day that started at 3:30am:

> "Again I had to endure the interminable wait that always intervenes between the final decision of the high command and the earliest possible determination of success or failure in such ventures. I spent the time visiting troops that would participate in the assault. A late evening trip on the fifth took me to the camp of the U. S. 101st Airborne Division, one of the units whose participation had been so severely questioned by the air commander. I found the men to be in fine [condition], many of them joshingly admonishing me that I had no cause for worry, since the 101st was on the job and everything would be taken care of in fine shape. I stayed with them until the last of them were in the air, somewhere about midnight. After a two-hour trip back to my own camp, I had only a short time to wait until the first news should come in."[51]

The 822 C-47s carrying the paratroopers and additional aircraft behind them towing the gliders of the 82nd and 101st ran into difficulties over the coast. Just before Fog made visibility a sig-

nificant difficulty. Some planes flew higher, some lower to avoid collision. Amazingly, there weren't any mid-air collisions. As they approached the shoreline they began to take damage from the flak of antiaircraft guns. One referred to tracer fire across the sky as "a nightmare in Technicolor."[52] Many were wounded or killed before they could get out of the planes. When the red indicator lights in the planes lit up, they stood. When the green lights turned on they began to exit, some having to step over wounded or killed comrades. Others were shot after they leaped from their planes into the illuminated skies and floated slowly to the ground.

Regardless of their fear or wrong circumstances, these men were committed: the pilots had orders not to return to their bases with any unwounded paratroopers. Glider pilots were permitted one chance to release their tow ropes. If things didn't look good for a landing in the right LZ or a suitable substitute, the towing aircraft pilot would make a second pass and release the rope for them. Once dislodging their paratroopers or releasing the gliders, the aircraft pushed their throttles to the maximum, and turned back for England.

Helmuth von Moltke, a German Field Marshall in the late 19th century, once said, "No battle plan survives contact with the enemy." Such was the situation in Normandy. The previously dropped Pathfinders weren't much of a help. Many of their beacons broke upon landing. Others' lights were destroyed or shrouded by dust because Allied bombers dropped their ordinance in the wrong place. Without the beacons for guidance, and with the clouds causing confusion and planes trying to avoid flak, many of the paratroopers and gliders were dropped and released far from their intended DZs. A few landed in exactly the right place, but most arrived in the dark somewhere other than they had expected. Many were "wildly blown like autumn leaves all over the Normandy landscape."[53] Some landed up to 25 miles away from their targets. The skies were fog-free for the British and Canadians to the East, but they had plenty of the other difficulties.

Sergeant Nibley climbed down the rope ladder on the side of the ship into the landing craft into the jeep. The craft went as far as it could go, opened up the front doors and Nibley drove out with five of six guys on it. They started driving with the water up to their necks. The jeep plowed through the water and up on

the shore. It was the first jeep on the beach that day. His next task was to find landmarks to identify the road to the building that they had planned to use as their headquarters, all while dodging enemy fire from 88mm big guns and small arms fire. He said, "As I'd heard it said so many times, in battle you're too busy or too excited to be frightened."[54] Once on the road, his passengers jumped off and scattered in all directions. He looked for the windmill that showed the way, but it had been bombed away. After wandering around and surviving a firefight from a foxhole, he found the farmhouse. He had successfully delivered General Pratt's jeep, but the general would never arrive to use it.

After General Pratt confirmed that he'd arrive in France via glider, his staff acted to protect him. They added armor plating along the bottom of the wooden craft in an attempt to protect him. It added several hundred pounds of extra weight to a glider that was already overloaded with passengers and equipment. The pilot wasn't told about this until just before takeoff when it was too late to do anything about it. The weight changed the glider's flight characteristics and center of gravity. At 1:19am, the glider took off being pulled by a C-47. It was the first off the ground. Anti-aircraft guns opened up on the gliders as they neared the release point. The pilot had been using significant additional physical effort to keep the overweight glider steady for their 221-minute flight. His arms and legs were strained. He found his LZ, which was about 1,200 feet (366 meters) long and sloped down. Because of the extra weight, the glider didn't stop when it should have. It crashed into a hedgerow at about 80 miles (129 KM) per hour. Everyone inside was injured badly enough that a passing armored vehicle decided that they had all died and left. General Pratt had been killed in the crash. If his staff had consulted with the pilot or ground crew they would have learned the unintended consequences that could come from trying to protect him with that armor plating.

Major General Maxwell Taylor, the commander of the 101st Division, jumped from one of the first C-47s over France. After landing, he couldn't see anyone in the darkness. He clicked his toy cricket and another man clicked back. "He was the most beautiful soldier I'd ever seen. We threw our arms around each other, and from that moment I knew we had won the war."[55]

Limitations: Expected and Unexpected

The Allies knew that the Nazis had flooded many fields as a defense to vertical invasion. Their plans avoided these areas that they identified by aerial reconnaissance. The storm that had just passed added these water hazards. What didn't show up on these photos were flooded fields where the vegetation had grown to the surface appearing as a normal pasture. Some of these were deep enough to be over the heads of dropping paratroopers weighed down with heavy equipment. Many drown in these man-made swamps.

Their photos and their maps also showed the hedgerows that marked the field boundaries. Somehow they failed to consider the significance of them. It seems crazy now looking back at it. I found some theories:

- This detail got lost in the mountains of other details they were evaluating
- The French underground failed to relay this intelligence
- Their overhead photos didn't show enough detail
- The information was lost in the bureaucracy
- Someone along the process deprioritized or disregarded it

The issue was that while the hedges in the US and UK that tended to be short rock barriers or wood-based fences that were overgrown with plants, those that were in this area of Normandy were formidable rock obstacles. They were often eight to ten feet (2.4 to 3.0 meters) high that had settled into place for centuries, many as "impenetrable as a stone fortress's walls."[56] Many of these hedgerow-lined fields had only one entrance.

The German army which had occupied this land for four years now were familiar with these geographical features and knew how to use them to their advantage. Many panzers and machine gun emplacements were set to turn these seemingly peaceful pastures into inescapable killing fields. This happened repeatedly in the early hours and days of the invasion. Many gliders landed in fields expecting to slide right though the hedges or have a soft impact only to slam into these rock walls with fatal consequences.

Communications were another severe limitation. Not everyone had a radio, in fact, few did. If one had been dropped far from

his DZ, been blown even farther in the wind and landed in dark without any of this platoon near him and without a radio, how would he know where to go? This was the situation for thousands early on June 6th. Each platoon had a five-pound radio called a "handie-talkie" but its range was only one mile (.6 KM), though many of these were lost or broken in the drop. A larger radio was given to fewer. It had a range of five miles (3 KM), but had several drawbacks including (a) its weight, thirty-five pounds (15.9 KG); (b) its size, it had to be worn on the back of a soldier to be carried; (c) and its visibility, the tall antennae made the radioman a favorite target for snipers.

There were many instances where poor communications resulted in needless delays, friendly fire incidents and the loss of previous gains. Here's just one example. After four days since landing, G Company from the 501st PIR in the 101st found each other and where they were. They proceeded to achieve their objective, the capture and control of a bridge over Douve behind Utah Beach. They had their radio, but it didn't work. Air Force fighters were flying over the area, so they tried making an arrow out of signal panels to point in the direction of a town from where they were taking mortars and machine gun fire. Because Regiment and Division leadership didn't know if company G was successful in holding the bridge for the Allied infantry's use, they decided to destroy it to prevent its use by any counter attack. So when the men from G Company saw planes returning to their area they were at first disappointed that they didn't shoot the town then terrified when bombs were dropped on the bridge where they were positioned. In this instance, the bombing didn't result in any "friendly" casualties, but it did cause confusion and the loss of a useful asset. There's at least one other bridge bombing story that's almost exactly like this one. That bridge was destroyed from the air after days of costly battles on the ground to get control of it.

Creating a Victory

Writing of the Allied plan to use two regiments to capture the town of Sainte-Mère-Égilse, Mr. Flintlock wrote:

That, of course, was the plan, but like most of the other plans that morning, this one began unraveling before it got underway… almost no troops came down on their designated drop zones. Ra-

dios had been smashed or lost in marshes that weren't supposed to be there. Maps were on the bodies of leaders drowned in the swamps or hanging dead from tree limbs. Weapons, ammunition, and other vital supplies safely inside equipment bundles that had been dropped who-knows-where. To top it off, enemy forces were stronger than anticipated. Yet, the airborne troops had been taught to improvise, to do the best they could with what they had, and to take charge of leaderless soldiers and accomplish the mission no matter the cost. And, out of confusion of the drop, that's what the American paratroopers began to do.

I wanted to include several of the stories where individual soldiers stepped up to lead groups of men to victory to capture objectives using quickly-devised tactics, but the litany of such instances was too long for a non-history book. Because the airborne forces were committed, understood their purpose, and knew their objectives, they felt comfortable tossing out the plans they were given if the circumstances in which they found themselves rendered those plans unusable. Across the Cotentin Peninsula in the dark that first morning and through the next few days, men rallied together to gain control of the region, regardless of rank or unit assignment. With very few exceptions, they acted to accomplish their objectives in whatever situations they found themselves with or without leadership or communications. Simply stated: it was perhaps the most successful mass of confusion in history. Some of the successes came easy, many were difficult, others were horrible struggles, and many didn't come until after disappointing failures.

One example should be enough to demonstrate. Corporal Jack Womer was a member of a platoon in the 101st with a distinctive name: the Filthy Thirteen. He landed in a swamp and almost drown, but a gust of wind caught his parachute and pulled him to shallower water. He and the other surviving men in the swamp could not find an exit until the light of an exploding plane allowed them to see the trees marking the way to the road. He gathered up as many men as he could. One of them being an officer who deferred to him to lead the group along a ditch adjacent to a road.[57] "Now, I didn't realize if you do anything that appears to be heroic, you automatically become a leader," said Womer.[58] In the next few hours Womer was almost killed by an 88mm cannon, a 20mm

cannon, a mortar round, and small arms fire. A captain sent him alone to look for other lost paratroopers. He found a dozen and organized them into a fighting party. Next, he led some additional men to seek out wounded men and bring them. After returning with those casualties for treatment, he organized the men that were with him in a defensive position, and was given command of men from the 506th regiment at a location with the inviting name of Hell's Corners. That was some day.

It was also a metaphor for the Allies' experience as a whole in those first few days of Operation Neptune:

- Almost killed upon arrival
- Getting Lost
- Gathered into small, then larger groups
- Led by the best leader available at the time
- Enduring difficulties
- Working to achieve changing objectives
- Surviving multiple opportunities along the way of being destroyed

The following brief summaries provide examples demonstrate topics that are important to us in this book.

Initial Nazi Reaction

Once the hundreds of Allied aircraft roared into French air space, it was difficult for the Nazi's charged with the continent's defense not to notice. Anti-aircraft batteries began firing. Officers from all across the Cotentin peninsula called and radioed their commanders' offices to report the event. They were all told that the real invasion would not happen during this period of poor weather and that when it did come it would happen in Calais. "No one of authority was present to make sense of it all."[59]

> He was furious. Major Hans von Luck, command of Panzer Gernadier Regiment 125…could not believe how long it was taking his superiors to wake up to the very obvious fact that the attacks taking place at that very moment across Normandy were the real thing, not some large-scale diversion designed to pull units away from Pas de Calais.

> As von Luck was being overwhelmed with reports coming in to his headquarters of allied parachute and glider landings, shore bombardments by hundreds of warships, and amphibious infantry landings, he could only shake his head ruefully. All of the message senders seemed to have one common denominator: they all urgently requested reinforcements.[60]

The major had a clear command that he couldn't move his tanks unless personally ordered by Hitler. Neither he, his tanks, nor his men could do anything until that order came. All he could do was put his unit on high alert. It was not until midmorning that Artillery General Marcks issued an order directing the 21st Panzer to move out to engage the invaders. He probably acted on his own authority, because that order was quickly countermanded.

Eventually the German High Command recognized the invasion for what it was, but by then Allied beach heads were established, several strategically important towns had been taken, and thousands of Nazi troops had been killed, injured or captured.

Hill 30: Worthless or Invaluable?

The 508th Parachute Infantry Regiment of the 82nd Division was led by Colonel Lindquist. They were supposed to land close to the Merderet River and capture a small stone bridge there, but most of his 2,000 men missed the DZ by a significant amount. One of his battalion commanders, Lt Colonel Shanley had the same problem of being far from his bridge objective with only few of his men. Shanley eventually gathered about 300 men, many of whom were from other battalions, and dutifully started moving for his objective at the Douve River. A mile away from his destination, they ran into heavy fire from a much larger force. Shanley reasoned that they would be unable to take the bridge so he moved back to a battalion rendezvous point, hoping that other lost members of the 82nd would also arrive there looking for friends. This otherwise inconsequential location was referred to on the map simply as "Hill 30." The location was thought to possess "virtually no military value."[61] It was an orchard-covered hill flanked by enemy positions on three sides.

On the march there, they found other groups of paratroops that were far from their own objectives and added them to their ad-hoc battalion. One of these groups mistook them for the enemy and started shooting at them. On a day where action was the rule, they found an exception: two hundred leaderless paratroopers sitting in a field waiting for someone to tell them what to do. Shanley told them to come with him. They arrived at 9pm. Lindquist told Shanley by radio that he would try to send reinforcements to him the next day.

Because of its location, overlooking the causeway to primary towns in the region and being close to enemy forces, it became one of the most valuable military holdings over the following week. Soon Shanley realized this, and their force did all they could do to take advantage of it. Because of their valiant actions there with infantry and armored reinforcements, they thwarted counter attacks aimed at separating the forces from Utah and Omaha beaches and retaking the strategic town of Carentan.

The fighting there and nearby on June 12 and 13 were called the "Battle of Graignes" and the "Battle of Bloody Gulch" respectively. These crucial engagements' have been immortalized in multiple books, movies, and even video games.

Focused on Objectives

Flint Whitlock opens the story of Lieutenant Colonel Otway and his group's actions with this introduction:

> One historian would call Otway's assault on the Merville battery, "the most singularly outstanding of personal leadership and raw courage displayed in Normandy during the predawn darkness of D-Day," and he would not exaggerate. Nowhere else during the entire invasion would so many things go wrong for the attackers, and nowhere would so much chaos and adversity be overcome by so few.[62]

Otway commanded the 9th para regiment of the British 6th division. They were assigned to assault the Merville Battery with it casemates protecting big guns. He thought it was suicidal but committed to it. It was thought that the fate of the British and Canadian invasion beachheads relied on the battery being destroyed. The battery's guns were sited to fire down the length of the Sword

Beach which was to be assaulted by the British landing parties. The facility was so reinforced that no amount of aerial bombing or artillery attack could significantly damage it. Only a ground attack by hand could do the job. It was imperative that the battery be destroyed and a signal given by 5:30am on D-Day. If not, the Navy would begin shelling in order to keep the gunners' heads down.

Otway described his leadership style this way: "I wanted to be respected and I wanted to be considered a fair person, but I wouldn't go out of my way to get popularity. I wanted an efficient, well-run, happy Battalion, and I reckon I had it."[63]

The 750 men in the regiment practiced the attack on a life-size replica of the battery built in England. They spent weeks rehearsing and improving their performance and timing. They practiced at night to simulate the conditions in which they'd do the real thing. After all the practice, Otway realized that the simple approach—landing far enough away to be unseen and safe, and then approach carefully—wouldn't work. Breaching the mine fields and other defenses would take too much time. He determined that they need to crash-land sixty men in three gliders as close as possible and to drop additional men by parachute inside the defenses. With the smaller group on the inside, the bulk of the paratroopers would land at a DZ 1.5 miles (2.4 KM) away and come quickly with support, weapons and explosives.

The plan was for a bomber group to deafen the battery's inhabitants prior to Otway's arrival. The 9th regiment were supposed to depart from two airfields at 11:30pm, on D-Day eve, meet up in the air shortly thereafter and fly to their destination in France. At the appointed time, the planes began to depart. Shortly after take-off one glider's tow ropes detached and forced a return to the airfield. Over the channel, another tow rope broke. The glider tried its best to get to land, but without an engine it fell short and all aboard died. Because of the communications blackout, no one else knew about these losses or were able to make revised plans based on them. Otway's lead plane began tossing violently when they started receiving anti-aircraft fire. He yelled into the cockpit for the pilots hold their course, thinking they were executing evasive maneuvers because of the ground-fire, but all the bouncing was because the aircraft's tail had been hit. Just then the green light turned on and they all began bailing out.

Otway wanted his advanced group to land on the German station and that's what happened. Many of them landed on and against the house where the battery's garrison lived. One corporal landed through the glass roof of a greenhouse attached to the headquarters' farmhouse. The battalion members were scattered across a fifty square mile area. At 3:15am, only 150 of the 750 men had reached the rendezvous zone, and there weren't any jeeps, big guns, mortars, radios, signal equipment, mine detectors, or anti-tank weapons. They did have some Bangalore torpedoes and some plastic explosives. They did have the flare gun to use as a success signal to the Navy. They only had about 2 hours to accomplish their objective.

Otway decided that they couldn't wait any longer for troops to arrive, and told the members of his leadership team that were there that they would proceed with who and what they had. He thought it would be a suicide mission with 750 men and all his equipment. How much confidence must he have had with this reduced force?

Just then, two of the gliders arrived. They were looking for a signal from Otway about where to land that he couldn't give. They did land safely, but the first one came to a stop four miles (6.4 KM) away. The second was shot as it approached the battery and landed in an orchard 200 yards (183 meters) off where trees tore off the wings. The Germans started shooting at the survivors, and thus the battle for the Melville Battery had started not at all how originally planned.

As the small group reached the outer wiring of the battery, they ran into Major Smith and a company of his men. He explained that they were late because the pathfinders had marked the wrong DZ. Smith and his men had already cut the wire and dug up some mines and marked a path through the field. He also explained a mystery: wasn't this area supposed to have been recently bombed to soften up the area? Major Smith explained that the bombers had instead bombed one of the DZs and the parachuting men fell to earth amid the bombs.

"As the aweful reality that his mission was on the verge of unraveling sank in, Otway counted his force."[64] He only had about a third and was missing some key leaders. He had to reduce the scope of his assault, quickly prioritizing what to do next. He

divided his men into four assault teams of 12 each, one per casemate. Two breaching teams of fifteen men were organized with the Bangalore torpedoes. A diversion party of seven men with a machine gun were assigned to attack the front gate to distract the garrison. But before he could say, "go" the Germans discovered them and started firing first.

Through the fire fight, the paratroopers made progress, improvising as they went while keeping their objectives and time constraint in at the foremost of their mind. The limited groups moved forward even though many were injured. Progress in battles like this can be fleeting. At one point, some men were able to breech the steel doors of one of the gun positions only to be killed by German grenades.

The German Lieutenant in command of the battery slept in the resort city of Franceville-Plage. The battery called him to announce the assault. He immediately called his boss, Lieutenant General Wilhelm Richter. He didn't respond to the request, dismissing the frantic call as a typical response from an Austrian soldier who were wimps and easily panicked. The general didn't consider one downed glider to be an invasion. Another more believing commander offered artillery support, but that would require some time and needed assistance for targeting which didn't happen for a while. The battery was on its own for now.

Eventually all the casemates had been entered, and the guns inside were destroyed using the little explosives that they had. At 5am, they fired off their flare gun which was observed by the royal navy. They then used the only communications option they had, a homing pigeon carrying a report of the battle. Of the original attackers, 75 were dead or wounded. Only twenty-two of the Germans survived out of the original two hundred. The medical orderlies began working on the wounded, both German and British. Captured German medical personnel joined in the effort.

Ottway's battalion next moved to achieve an objective for which they had never specifically trained. 6 miles (9.7 KM) away was a high point overlooking the two Orne Bridges that were the objectives of the remainder of the 6th Division. They endured several skirmishes along the way. Others of the regiment found their way to their group so the total force grew to about 270 men. The stragglers arrived in time to withstand another assault on

their position that included panzer tanks. Reinforcements from the beach didn't arrive until June 12th. During the five days at this new location, later called the Battle of Bréville, another 150 men were killed or injured. It was the turning point for the Orne bridgehead, and ended the German threat in that sector.

Leadership is not Indicated by Rank

In the fight for one of the bridges over the Merderet River, two companies from the 82nd were sent in a flanking maneuver in the late night of June 8. The companies got separated in the darkness. One of them found their way to a road that was lower than its surroundings just as the enemy began shooting at them. Their platoon leader, a lieutenant, was killed early in the skirmish. Leaderless and lost, the platoon, "was on the verge of being slaughtered."[65]

A private, Charles DeGlopper, told the remainder of the team to take cover at a hedgerow. While only twenty-two years old, he had plenty of combat experience participating in the operations in North Africa, Sicily (where his actions earned him a Bronze Star medal), Italy, and his day in Normandy. He drew the Germans' fire by remaining in the road and shooting with his automatic rifle. He continued firing despite being hit several times. His wounds eventually dropped him to his knees, but he continued firing until he ran out of ammunition. Private DeGlopper died in the road, but not before distracting the Germans long enough for his platoon to escape, join up with the others in their regiment and successfully capture the bridge. Later, as that location was inspected all were amazed at the impact that just one man's initiative had on enemy's strength, knocking out many troops and their weapons. Private DeGlopper was the only member of the 82nd to receive the Congressional Medal of Honor for service during Operation Neptune.

Summary

The first reports of the status of Neptune came to Ike via Admiral Ramsey who got the data from a phone call from Air Marshall Leigh-Mallory. All but 29 of the 1250 C-47s had returned. The report also said that the parachute drops went off smoothly, and

that only 4 gliders were lost. They didn't have much information, but what they did have was encouraging. Obviously, without communications, they didn't know what was really happening on the ground those first few hours. If so, perhaps they would have felt completely opposite—that Leigh-Mallory's prophesy of disaster had been fulfilled.

The following day, information from Normandy began to filter back to headquarters. The numbers looked horrendous. While beachheads were established and initial objectives where secured, it appeared that the airborne drop had been a disaster with high casualty counts. General Omar Bradley wrote, "But as 'lost' units trickled in through our lines, we discovered that airborne losses did not exceed 20 percent. Even some of the pathfinders survived. Not until we had turned the Utah force north toward Cherbourg did we learn how effectively those airborne troops had paralyzed the enemy's rear."[66] After a brief threat in the morning on Omaha Beach, it was clear that the amphibious landings had gone better than expected. The next day, Leigh-Mallory wrote a letter to Ike admitting he had been wrong in his assessment and congratulated Ike on the wisdom of his decision to go ahead with Neptune.

Neptune wasn't the only reason that the D-Day invasion was a success, but one could correctly assert that Overlord might not have succeeded without it. The cunning plan of Neptune didn't win the day. As we saw, those plans fell apart. The men didn't. Their character and courage and commitment to overcome obstacles and obtain their objectives was the key. General James Hill predicted that chaos would reign in battle, and it did for a prolonged period. The difference between victory and loss was how those men performed with in their assigned responsibilities during the chaos.

Do not confuse historians' and my observations to say that every participant performed perfectly amid the difficulties and changing situations, that there weren't any atrocities committed by the Allied forces, or that all the men acted with honor all the time. Hugh Nibley's account mixes praise and abhorrence for his comrades sometimes in the same sentence of his account. While acknowledging the horrors of war and the imperfection of men, he and we can see and learn from what happened. If we had wanted to criticize we wouldn't need to look too deeply. If

we were number crunchers, we might be tempted to calculate an efficiency rating for on-target drops. That number would be embarrassingly low. In my research, the narratives of those that landed on target stood out because of their rarity. If we looked at the big picture, we might criticize several Generals that had promised certain advancements within three days that required more than two months to accomplish. General Taylor had promised the 101st that they'd be brought back to the UK after 72 hours, however their return didn't happen until after about five weeks. The official plan said that on D-Day plus 5 that they'd be in position to move North. They weren't ready until D plus 50.[67] That means his estimate was off by 900%.

Eisenhower was consistent in his reaction to the mix of good and bad news. He arrived in France on June 7th, expecting to make changes to their plans. "Unforeseen difficulties are always certain to develop in the execution of a plan of this kind…They are easily enough handled if the high command is alert to the situation and in position instantly to make a decision that prevents the difficulty from assuming unnecessary proportions."[68]

The Nazis close to the action who did recognize the invasion for what it was understood what they should have done in response, yet they were almost uniformly restricted from doing so because the top-down, ridged command structure didn't accept the information they received. It appears that those in command were only willing to do what their plans had anticipated without any willingness to consider they may not have been appropriate or accurate. Had they been less dogmatic, eliminated organizational boundaries to focus on objectives, and given their men in the front lines the power to act, the German forces could have repelled the invasion. They relied too much on their superior fortifications and not enough on being flexible and quick. Years before, the Nazi's captured Europe using a revolutionary new warfare that they called "lighting" because of its speed. Their initial response to operations Neptune and Overlord were the traditional actions of bureaucratic warfare that led to the Allies' previous defeat. It wouldn't be exaggerating to say that their complacency and perhaps arrogance had completly flipped the tables: The Allies were the revolutionary innovators and they played role of the un-

prepared losers. Unbelieving minds and immobile assets became fatally unrecoverable.

Prior to D-Day, the Atlantic Wall looked more than formidable to the Allies. To the Germans, it appeared secure. Stephen Ambrose, who may have written more about the continental invasion than anyone else made this observation:

> The Germans had taken four years to build the Atlantic Wall. They had poured thousands of tons of concrete, reinforced by hundreds of thousands of steel rods. They had dug hundreds of kilometers of trenches. They had placed millions of mines and laid down thousands of kilometers of barbed wire. They had erected tens of thousands of beach obstacles. It was a colossal construction feat that had absorbed a large percentage of Germany's material, manpower, and building capacity in Western Europe.
>
> At Utah [Beach], the Atlantic Wall had held up the U.S. 4th Division for less than one hour. At Omaha, it had held up the U.S. 29th and 1st divisions for less than one day. At Gold, Juno, and Sword, it had held up the British 50th, the Canadian 3rd, and the British 3rd divisions for about an hour. As there was absolutely no depth to the Atlantic Wall, once it had been penetrated, even if only by a kilometer, it was useless. Worse than useless, because the Wehrmacht troops manning the Atlantic Wall east and west of the invasion area were immobile, incapable of rushing to the sound of the guns.
>
> The Atlantic Wall must therefore be regarded as one of the greatest blunders in military history.[69]

About 4,000 Allied men were killed and about 6,000 were wounded in Operations Overlord and Neptune.

Aftermath

The overall mission of the Normandy campaign was completed slower than planned but it's eventuality arrived. The Allies established a secure beachhead with a good supply chain from the deep-water port of Cherbourg, at the tip of the Cotentin Peninsula, to the mouth of the Orne river to the east. The German High Command was so convinced that Calais was ultimately the target

that they didn't decide until late July to move reinforcements from there down to engage where the war really was.

After breaking out of their beachhead, the ground forces were separated into two army groups, each with two armies, headed by U.S. General Bradley and British General Montgomery. Over the course of the next nine months these lines of demarcation grew more and more defined as each army competed for resources and approvals for their own ambitious ideas. Over time Patton, and Montgomery emerged as the primary competitors, each trying to reach Berlin first. Virtually all of the primary generals cut back on their communications, erecting what we'd call silos in today's business vernacular. Patton bought into Eisenhower's overall strategy though he wanted a bigger role. Montgomery opposed that strategy in favor of his own that Ike wouldn't support.

Arrogance and insulation increased. I'll mention only one example, though there are many, and only very briefly. This was Operation Market Garden. Montgomery planned his invasion of the Netherlands without even consulting with Dutch Prince Bernhard who commanded the Dutch forces and ran the underground and who could have provided him with badly needed intelligence. The operation was the biggest disappointment of the European campaign and is still controversial. It had all of the ingredients of an event more about appearances than outcome. In an attempt to make the disastrous loss appear useful, the General called it a 90% victory. He was backed up by his patron, Churchill. There were long lists of excuses and scapegoats. [By contrast, prior to giving the order to launch Overlord and Nuptune, Eisenhower wrote the following press release to be used if necessary taking full responsibility in case of a defeat: "Our landings…have failed… and I have withdrawn the troops…If any blame or fault attaches to the attempt it is mine alone."[70] This was only three months removed from D-Day, but operationally and attitudinally it was far removed. Specifically, its core plan was contrary to Eisenhower's overall strategy of a broad frontal attack and the communication between the leaders were less than open and honest.

The same was true with the media back in their respective countries. "During the time we were in Normandy, after a day of fighting we'd hear the day's news reports on the BBC, and according to the news it was just British fighting the war. The whole

thing was a British enterprise. We'd hear about how a British division had taken this position and that village. We'd hear reports about fighting on all the other beaches, but we'd never hear about the American beaches."[71] I suspect the same was true with American media outlets.

The Allies entered Berlin the following May, and war in Europe concluded. It's impossible to guess how quickly and how many lives on both sides could have been saved had the principles employed by all the leaders in Normandy's invasion continued with the same conviction.

END NOTES

1) Eisenhower, Dwight D.. Crusade in Europe (Kindle Location 234). Knopf Doubleday Publishing Group. Kindle Edition.)
2) Ibid (Kindle Locations 251-253)
3) Ibid (Kindle Locations 177-187, 189-191, 305-306)
4) Spencer F Wurst and Gayle Wurst, *Descending from the Clouds: A Memoir of Combat in the 505 Parachute Infantry Regiment, 82d Airborne Division* 10 September 2007, Inside Cover
5) Brian Nolan, *Airborne: the heroic story of the 1st Canadian Parachute Battalion in the Second World War*, page 8
6) Flint Whitlock, *If Chaos Reigns, The Near-Disaster and Ultimate Triumph of the Allied Airborne Forces on D-Day, June 6, 1944*, Casemate, Philadelphia & Newbury, 2011, page 3
7) Jean-Yves Nasse, *Green Devils: German Paratroopers 1939-1945*
8) *Chaos,* page 5
9) *Chaos,* page 5
10) *Chaos,* page 14
11) *Chaos,* page 47
12) *Chaos,* pages 47-49
13) *Chaos,* page 47
14) Bernd Horn and Michel Wyczynski, *Paras vs. the Reich: Canada's Paratroopers at War, 1942-45,* page 237
15) John Sadler, *Operation Mercury: The Battle for Crete*, page 211
16) *Chaos,* page 48
17) *Chaos,* page 59
18) *Chaos,* page 269
19) *Chaos,* pages 57-58
20) *Chaos,* pages 29-31
21) Anthony Beevor, *Crete 1941: The Battle and the Resistance*, (2005) Introduction
22) *Chaos*, page 32

23) *Chaos*, pages 32-33
24) Ken Ford, *The Bruneval Raid: Operation Biting 1942*, (2010) page 12
25) David Rolf , *The Bloody Road to Tunis: Destruction of the Axis Forces in North Africa November 1942-May 1943*, (Frontline Books) page 41
26) *Chaos*, page 60
27) *Chaos*, pages 81-82
28) *Chaos*, page 10
29) *Chaos*, page 10
30) *The Columbia Dictionary of Quotations* (Columbia University Press, New York, 1993) page 688
31) *Chaos*, pages 142-143
32) *Chaos*, page 61
33) *Crusade*, pages 237-238
34) *Chaos*, page 86
35) *Chaos*, page 88
36) *Chaos*, page 99
37) *Chaos*, page 118
38) *Chaos*, pages 130-131
39) *Chaos*, page 245
40) *Chaos*, page 256
41) *Crusade*, page 112
42) *Crusade*, Kindle Locations 4606-4619
43) Crusade, Back Cover/Dust Jacket
44) Crusade, pages 249-250
45) Hugh Nibley, *Sergeant Nibley, PhD.* (Deseret Book Company. Kindle Edition) Kindle Location 1833
46) Leonard Rapport and Arthur Northwood, *Rendezvous with Destiny: A History of the 101st Airborne*, (Pickle Partners Publishing, 2001--Originally published in 1948) page 133
47) *Chaos*, page 129
48) Michael Korda, *Ike: An American Hero* (Harper Collins, 2007) pages 54-55
49) *Chaos*, page 132
50) *Chaos*, page 133
51) *Crusade*, page 251-252
52) *Chaos*, page 172
53) *Chaos*, page 272
54) *Nibley*, Kindle location 2067
55) *Chaos*, page 159
56) *Chaos*, page 246
57) Richard Killblane and Jake McNiece, *The Filthy Thirteen, From the Dustbowl to Hitler's Eagle's Nest: The 101st Airborne's Most Legendary Squad of Combat Paratroopers*, (Casemate, Philadelphia & Newbury, 2003 and 2010) page 104
58) *Chaos*, page 163

59) *Chaos*, page 148
60) *Chaos*, page 203
61) *Chaos*, page 188
62) *Chaos*, page 206
63) *Chaos*, page 207
64) *Chaos*, page 212
65) *Chaos*, page 297
66) *Chaos*, page 288
67) *Crusade*, Kindle Location 4956
68) *Crusade*, Kindle Location 4734
69) Stephen Ambrose, D-Day: June 6, 1944: The Climatic Battle of World War II (Simon & Schuster, New York, 1994) p577
70) Stephen Ambrose, *Eisenhower, Soldier and President* (Simon & Schuster, New York, 1989) pages 139-140
71) Nibley, Kindle Location 2448

Chapter 2

It's Your Stuff

Background

Before and during World War II, my father worked with computers. These machines were revolutionary but still very limited in what they could do. They were programmed with punch cards and plug-in colored cables. They were huge and difficult to move around—but, compared to people, they were pretty good at counting things and managing lists. So, my father went from the accounting department at the Portland shipyards in the private sector to being a private in the army in England calculating the Allies' logistics planning and reporting. He moved from there to France and Germany before getting on a ship headed for Japan.

Among computers' limitations was the storage of data that needed to be reviewed and processed. IBM invented the hard disk drive in the mid-1950s and sold the first one in 1956. The entire enclosure was about the size of two and a half refrigerators. The main apparatus was a cylinder with 50 disks stacked one on top of the other like some Art Deco jukebox. Total storage was between 3.5 megabytes (MB) and 5 MB depending upon the model. This was a huge step forward in computer technology. They continued to do significant research and development to improve capacity and access speed. These devices were necessary to sell their big and expensive computers in higher quantities. The mainframe computers, along with the associated software and services, were the bulk of IBM's revenue. IBM had about 60% market share and wanted to maintain this dominant position.

By the early 1970s, they created two new storage device types. One was called a floppy drive. This is the same basic concept as the hard drive, but the rotating media was flexible. This media was less expensive but had reduced precision. Therefore, a floppy drive's storage capacity was far less than its ridged media counterparts. By the end of the decade, the top-of-the-line floppy drives had a capacity of 1.2 MB using 8-inch removable disks. They were too expensive for the new personal computers and too small in

capacity to sell in high volume to their mainframe customers. (I'll use "FDD" for floppies and "HDD" for hard disk drives.)

The second new device was a huge breakthrough. It was called the Winchester hard drive. The difference between the Winchester and previous HDD designs was the design actuator assembly, which held the read/write heads over the media. It looked and moved like an elbow and forearm. These arms were precisely attached to the device and positioned carefully in relation to the disks. At that time, most HDDs were about the same size as the washing machine and sold for more than $50,000—some up to $500,000. The Winchester system was at a much lower cost and simpler to work with. It was named after the Winchester Mystery House in San Jose, California, the city with the R&D facility where the new product was created. My father worked for IBM at that location at that time, but it doesn't have anything to do with our case study.

During the 70s, all of these technologies were developed and improved. IBM looked at their peripheral products based on their ability to support the sales and service of their mainframe business. This meant that the large and expensive hard drive systems were preferred to the new Winchester. FDDs didn't have any priority at IBM.

Near the end of the decade, FDDs became popular with the new personal computer market because of their low cost. The Apple, TRS, and Commodore computers were becoming popular and needed storage devices. Some of these customers resorted to using audio cassette tape players for storage, but these were slow and very limited. A smaller FDD size was created in the mid-1970s, just in time for these small computers. Its cartridge was 5.25 inches wide. Shugart and Memorex were the leading manufacturers, but several others began manufacturing when the new personal computer industry adopted these as their default storage devices. In 1981, when IBM finally introduced their own personal computer, they also chose to use the 5.25 inch FDDs. These were relatively inexpensive. They were low in capacity but met the needs of many of those early PC users. In the early 1980s, floppy drives had a storage capacity of less than 200 kilobytes per side. Floppy disks reduced in size to 3.5 inches and increased capacity to 1.44 MB during the 1980s.

Also, in the late 1970s, an engineering group at IBM working in Tucson, Arizona, was experimenting with a high-capacity removable flexible media device. They saw a need for something that stored much more data than an FDD, but was priced much better than HDDs–even the early Winchester Drives. The method they used to achieve the high capacity was a new design for the read/write head. They made it shaped like a wing, employing the Bernoulli principle, named after the 18th-century scientist who discovered why birds can fly. The big problem with hard drives, both the expensive monsters and the Winchester, was that the heads needed to be very close to the spinning ridged media to store and retrieve the data in high capacity. They could do this because of the precision mechanical designs that positioned the heads above the storage media, but very close. It was not uncommon for malfunctions to happen, allowing a head to come into contact with the media which would destroy the head and media surface. Sometimes the shrapnel from the collision would destroy the entire device. This is called a head crash. Floppy drives didn't have this problem because their heads were relatively far away from the media, and that's why they didn't have much capacity. With a head shaped like a wing, the new device in Tucson never crashed because the head literally flew over the flexible media—because it flew closely, they could achieve higher capacity.

This innovative technology wasn't very interesting to IBM. A 10 MB floppy disk did not sell more mainframes. It was more expensive than an entire personal computer. Therefore, IBM decided to drop the program. The engineers working on it wanted to continue the project, so they asked for and received a grant of the basic technology to start their own company.

This firm, Iomega, was established in 1980 with $5 million dollars of venture funding from Idanta Partners, based in San Diego. Its leader, David Dunn, became the chairman of the board. The first product was launched in 1983. It had a capacity of 10 MB. Its retail price was $2700. This was comparable to the retail price of an external 10 MB Winchester hard drive at the time. The advantage of the Iomega product was that for the same price one could have the same capacity. Because of its removable media cartridges, similar to FDDs, Iomega storage options were very interesting for PC users who needed more. For about $3,500 customers

could have 100MB of storage by using multiple media cartridges, though only 10MB disk could be used at a time. On the downside, the device operated slower than an HDD and the device was about the size of a large PC.

It was obvious that the company was started by and run by engineers. The product name was horrible: the Bernoulli Box. Many customers couldn't spell it, many more didn't understand the name's meaning—or care. The company name, Iomega, was selected from employee suggestions.

The original 10 MB Bernoulli Box was a large device that was almost too heavy and large to be easily carried by one person. As time went on, the capacity of the product increased to 20 MB, 44 MB, 88 MB and so on. Its size also became smaller so that the Bernoulli cartridges were a similar size familiar to the market: close to the standard 5.25" form factor.

The company was initially very successful. In the same year that it launched it raised more than $21 million in an initial public offering. Sales grew to $126 million within three years. Eventually, the Bernoulli Box came in several different configurations with a capacity of 230 MB per cartridge and the retail price starting at $695. Total sales reached as high as $150 million. The Bernoulli Box was targeted at several small niches of users that that used large file sizes, used project-based data, or needed large "near-line" storage. The most typical users were desktop publishers that used graphics on a Mac or a design engineer on a PC. These users bought their computers through value-added resellers who got their Iomega product via a few large computer product distributors.

Iomega's problem was that after more than a decade of successful development and sales the company was not earning profits. The people there described the situation as "the treadmill." This is meant that they were always working to make their device in a higher capacity, at a lower price, and faster data throughput. Their competitors were doing the same thing. They competed against all storage products tangentially, but the direct competitor was a company called SyQuest which was on the same treadmill. One company would release a new product that was better than the other's. Then the other company to matched the offering or did slightly better. There wasn't ever a chance to rest: they were chas-

ing a higher capacity, less expensive and faster offering—always running but not making any financial progress. It was an unrewarding treadmill. Revenue fluctuated but was basically flat and without profits. The board of directors wasn't happy and neither were the shareholders.

Mobilization

After trying several internal people in the position of CEO, the board hired Kim Edwards from a rechargeable battery division of General Electric. The engineering group at the company was shocked that they chose someone that wasn't from the computer storage industry in particular or the computer industry in general. Many of them told me that their big question was, "He doesn't know about the technology or market, so how can he help?"

Kim may not have understood the nuances of flexible rotating magnetic media storage technology, but he did understand business. Shortly after arriving, Kim defined the company's mission. It was this: Give customers the storage products they want where they want to buy them and at a price that they are willing to pay. Everyone in the company had this memorized long before I arrived as an employee in 1995. It was the basis of everything the company did. This mission had objective-like language within it, but there were also some additional supporting objectives such as a target announcement date and financial performance.

The first question that had to be solved was, "What storage products do customers want?" Many of the employees had been there for a long time and they thought they knew the answer: bigger, faster and with an incrementally better price per megabyte. However, Kim didn't accept conventional wisdom. That's what had pushed the company to the edge of shutting down. He forced them to look at things afresh. He appointed a small committee to learn how to fulfill the mission. The research group's leader was Tony Radman, one of the original engineer-founders. Other key members were Brent Watson, the head of Advanced R&D, and a newcomer with a high-tech marketing background, George Meyer.

This committee started their quest to find out "the storage products that people want." They didn't restrict their research to their previously-defined niche, but explored the entire market

because they interpreted the mission's "customers" as current and potential computer users everywhere. They found something very unexpected. There was a huge market removable storage for normal personal computer users. In the early 1990s, computers were on the road to becoming ubiquitous in homes and at the office. This investigation opened their eyes to a much larger addressable market. They unimaginatively called this newly defined segment the "consumers." They also found a large market with the advanced users of personal computers. These "pro" customers needed something with a very high capacity and great performance. The pro segment was not as large as the consumer, but it was still much larger than the niche in which Iomega been in for the previous 10+ years.

Getting the consumers to define what specifications they needed was difficult. When Tony's group asked what capacity the product needed to have, they were told, "Enough for my stuff." They asked how fast it needed to be they were told "Fast enough to get my stuff." For engineers who spent a decade running on a specification treadmill this wasn't as precise of an answer as they wanted. The one thing the consumers knew for sure was it wanted the price to be $100, and while they were willing to pay more, it could not exceed $199. That was the absolute maximum.

After digging in with more questions, they were able to put together a definition for the two segments. The Consumers wanted something with okay size, okay performance and a great price. The Pro segment was the opposite: great capacity, great performance, and an okay price. When the committee charted these two new segments on a price/performance scale they identified why their current sales had been limited. The Bernoulli Box was situated at almost the exact center of a line between the two sweet spots, a no man's land. After convincing Kim of their findings, he made the swift decision to make new products to fit these definitions.

They decided that the product for the consumers did not need to be any bigger than 100 MB. 100 sounded like a big number to those where were unfamiliar to specifications. It was big enough that it couldn't be confused with a 1.44 MB floppy drive. They wanted to charge more but were stuck with a retail price of $199. The cost reduction activities necessary to do that was foreign to

the company. The pro customers needed at least one gigabyte of storage and performance similar to an internal HDD. At that time, the only way to do this was to create a removable cartridge with rigid media which was also something completely new to the company.

The interviewees told Tony's team that they wanted to buy these devices at the same place as they bought their computers: chain stores like Best Buy and Circuit City, or well-known catalog-based sellers. To have success in these new sales channels the company needed new branding, new packaging, and product names that are easier to remember and spell than Bernoulli Box. They named the new products Zip and Jaz, and renamed and repackaged their existing tape backup product to Ditto.

Moving from a traditional product with limited appeal to new products with greater potential sounds like an easy decision to make given their circumstances, but any dramatic change can make the earth feel unsteady to the employees as it did to those people in Northern Utah. In the lab, was the latest iteration of the Bernoulli Box, code-named Aspen. It was faster and had a breakthrough capacity, but it wasn't big enough or fast enough for the newly-defined Pro market. It was far too expensive for the Consumer market. It was a great leap forward on the treadmill and felt good to all those accustomed to that game. When Kim killed the project, there was almost a real revolt. These engineers and their managers were proud of the new product that had more than 400 MB of storage, but the new "battery salesman" told them to throw it away and make something with only 100 MB. They felt simultaneously insulted by the request to make a product smaller and scared by the requirement that it be manufactured for less than a third of their current costs. And . . . they had to demonstrate working units of the new product at the consumer computing tradeshow, Comdex, that was held in November in Las Vegas of that year. The arguments were intense, but Kim's leadership won: either we succeed at this or the company goes out of business. They weren't happy but they moved forward with determination.

While R&D was busy making the two products described above and a revised tape backup product for the Consumer market, the company had to start the branding, positioning, and messaging—building a completely new corporate identity. Just about every-

thing except for the company name was changed. Transforming a treadmill, niche company into an innovation house that can sell a product under $200 in retail environments required far more changes than just new specifications and a new logo. The company needed new people with the talents and experience suited for the new channels and the new way of doing business. Key hires included new vice presidents of marketing and sales, and great product management including Andy Grolnick with Zip, Maury Domengeaux with Jaz, and Jackie Finch (now Fredericks) who made the rebranding and packaging all come together with the products.

As the new people came into the company, many existing employees' jobs changed to match the new realities. For example, the incumbent vice president of sales became the director of distribution sales. He took the step down graciously because he knew that he didn't have the capabilities or the experience to take a product to the retail channels. Some successfully transformed from being low volume professionals to mass-market thinkers and doers. Others had less successful transitions or left the company. In most cases, the existing employees eventually committed to working hard to make the transition successful. Some did so begrudgingly and only because they liked living in the area, and didn't have any work alternatives in the region.

Operation Zip

The change process, which we'll talk about in a subsequent process, was daunting in this case. The company was already in financial difficulties and yet it had to develop new products and rebrand itself while hiring new people and working with new PR and Ad agencies. They were rebuilding a company and creating a new culture, all while still trying to maximize revenue and margins on their current products. Everyone worked long and hard. The choice was made to focus primarily on the Zip product at first since that was most similar to the technology they already understood and had the largest potential market.

Several weeks prior to Comdex, Kim asked if anyone had conducted a usability study with the new consumer product. They hadn't. They have been selling removable media products for more than 10 years and felt like they understood all the issues.

To them, their tight schedule prevented them from such a luxury. Kim insisted that they do a usability test because the new Zip drive was to be sold to different users than those for the Bernoulli. With such short notice and limited funds, it would be impossible to do a proper focus group study, and act on any results prior to the tradeshow. Again, many grumbled that a battery man shouldn't be burdening the storage experts with unreasonable demands.

Someone (I was told it was Kim) suggested that since they didn't have the time to do a formal study, they should do as much as they could within the time requirements. Some drove down the road to test the prototype Zip drives and disks in a classroom of children at the local elementary school. This turned out to be the perfect test environment.

The initial design for the Zip was similar to the old-style VCR with a cartridge holder that popped out of the top of the device. A user just needed to slide the disk cartridge into the carrier and push it down into the device. At the school, the children had difficulties. Some tried putting in the cartridge in its carrier upside down. Some did not understand how to push the carriage down into the enclosure. And I was told that at least one child shoved the sandwich into the device. The study was a failure in that it showed the mechanical design for the Zip drive was not correct, but it was a huge success because they discovered a problem before they launched. The Iomega people asked the teacher what kinds of computer equipment the children could use properly. She responded that they operated a floppy drive just fine. Kim's subsequent instructions were clear. They had to redesign the mechanical design of the Zip drive so that it operated similarly to an FDD and permitted the disk to only be inserted correctly. The big challenge was to complete this mechanical design change and build a few working units in time for Comdex.

Through focus and commitment to succeed, they succeeded in producing the bare minimum number of working demonstration units for the show. It was one of the great examples of organization and technological triumph of the decade. The debut of the Zip drive was a fantastic success. It was slower, and it had less capacity, but it was easy to use, had a great price, and looked really cool.

Creating a Victory

Within one year, Iomega developed an entirely new market strategy, three new product lines, a new corporate identity, and launched it in the real world—and did this while running their current business. It was possible because they understood their mission and they were focused. There weren't any big meetings with scores of people that took weeks of deliberation to make decisions. The most important meetings were short hallway conversations. They were all instantly aligned with each other because they were all working for the same mission and objectives. Why are we changing the mechanical design? It must be because that's the storage product that people want. It didn't take 20 PowerPoint slides to explain it. Unless something was necessary the company didn't do it. Why are we sending someone to Fry's electronics to set up a reseller agreement with them? It must be because that's one of the places that people want to buy the product. Because of the commitment to the mission, a certain trust was infused in everyone that whatever others were doing must be to support the mission and the objectives. The new culture clicked into place once everyone saw the success that came from doing things differently: faster, focused, and stripped anything that didn't produce value for the customers.

Zip launched with the retail price of $199 and Jaz launched for the retail price of $499. Total sales for all products at Iomega in 1994 where are $141 million. At the end of 1995, revenues were $326 million; In 1996, $1.2 billion; and in 1997, $1.7 billion. That is more than a 10X improvement in a very short time. The stock market rewarded the company very nicely. Adjusted for splits, the share price rose from $0.67 to $150 in exactly 2 years (May of 1994 to May 1996). Market capitalization rose 522 times, peaking in late 1996 at about $7 billion.

I need to interrupt here to explain the economics of removable media storage devices, more specifically the Zip, Jaz and Ditto products. Their cost and price structures are like the classic "razor and blade" model. The profit was not in the Zip drive, but in the disks. After sales channel discounts, cooperative marketing expenses and amortization of development and production setup costs, the drives were sold without margin. We sold the

disks with more than 80% gross margin. Iomega's sales channel sold Zip disks for a suggested retail price of $10. We were always monitoring how many disks were sold per drive. We called this our tie rate—the number of disks tied to a drive. It was the most important number in the company. If we only sold one disk per Zip, we'd die, but if we sold seven, we'd be extremely profitable. A small percentage increase in the tie rate would deliver profits right to the bottom line.

Rapid increases in sales always create difficult challenges. The most obvious issue was cash flow. They had to build the tooling and equipment to increase the manufacturing capacity up front. The parts must be purchased from the supply chain 3 to 5 months before the channel paid the company for the finished product. Many needed to be hired with up-front recruiting and relocation costs before any returns could be generated. The crisis of failing turned into an even more pressurized crisis of success. The company could not afford any prolonged difficulties during this dangerous transitional period. As the company and the people in it learned how to work in the new markets, with the new products and new marketing activities, they also needed to find a way to financially and operationally survive.

This was 1995. Somewhere Jeff Sutherland was in the process of inventing something called scrum, but in the shadow of the Wasatch Front mountain range in Roy Utah the employees of Iomega were oblivious to that. Yet, Kim and his executives independently created their own version to align the company's activities, collaborate quickly to solve problems, disseminate lessons as they were learned, turn accountability into power, and allow everyone to focus on the most important stuff. They even established their own version stand up meetings held in a very ugly room with cheap chairs and long folding tables. Today's scrum instructors would call this meeting a "scrum of scrums," but that's a topic for the fourth section of this book. For a period of time, several days a week, depending upon how high the mountain of issues was, Kim held this meeting with members of his staff and others invited that could contribute to the topics at hand. It wasn't meant to be pretty. The idea was to get the status of projects, what was being done, identify obstacles, make quick choices if they could be done quickly, and move on. Presentations of these meetings

did not have to be fancy. In fact, I think that was discouraged. The requirement was to get to the point quickly.

By the summer of 1996, things began to settle down. There were still issues and challenges. But the desperate urgency was transitioning into something just as exciting but much more comfortable. The cash crisis abated. Confidence in the strategy was growing as everyone saw the results in the market and on the income statement. The discussions turned from "how do we survive?" to "how do we grow even more?" Those discussions became more intense and more formalized as the company entered 1997.

Because of those growth expectations, operations decided to move from outsourced manufacturing in the Philippines to a newly purchased factory in Penang, Malaysia in the summer of 1996. Iomega bought it for $28 million. It was 376,000 (34,932 square meters) square feet.[1] Even though the quality of work from the contractor was very good, they anticipated that having total control of the manufacturing operations would give them additional benefits necessary for a high-growth company. The new factory was beautiful. The quality plummeted upon transfer to the venue, but began to make steady, though slow, improvements.

Leadership, Standardization and Legacy

At this point, I was working for Tony and was on the corporate strategy committee. The question we all wanted to answer was this: How can we make Zip a standard in the marketplace? We began very extensive research on how certain products become market standards and others fall to the side. How did Intel become the standard CPU for PCs? How did Microsoft become the operating system king? How did VHS become the standard in videotapes? Many people knew the simple stories behind these examples, but we dug deep into the details on these and other instances in several different industries. We looked at the topic as objectively as possible, diving into the information even if he thought we knew the answer. We found many surprises. Sometimes products could sell tens of millions of units and never become a standard, while others became de facto standards when their volumes were still small.

The most interesting one to us was the compact disc. The CD was invented in the late 1960s. Coincidentally, I met its inventor just after this research was complete in a review of a potential acquisition and got some behind-the-scenes details from him. The CD was developed at a nonprofit research laboratory, sold to a technology broker, who quickly sold it to Sony and Phillips. The CD player was an expensive product for audiophiles in the 1980s before the prices began to decline. CDs were used in computers in the early 1990s, but because of varying formats and difficulty with software drivers, it languished for several years until it could reliably be installed into most systems. And then, Boom! It was built into almost every computer being sold. What made the boom? The answer to that question opened up a whole new way of thinking about how customers make choices and help companies identify new products to create.

The credit for this discovery probably goes to George Meyers. In our strategy discussions one day, George laid out his theory. There're only so many things that people could do with computer data. These things are best described by simple verbs such as store, move, distribute, and backup. Anyone who bought software applications in the 1980s and early 1990s remembers opening the package and finding a set of FDD diskettes, ranging from a single unit to box of them numbered 1 through whatever. I remember many times spending hours installing software onto an HDD via a series of diskettes, waiting for the prompt telling to take one out and insert the next. No one liked it. But in 1997, virtually every new software application was distributed on CDs, and for most applications only one disc was required. How did CDs become the standard for the distribute action? The answer was that on one day Microsoft announced it would stop distributing its operating system and applications on floppy disks and start doing so on CDs. Microsoft's choice was based upon cost and user convenience, but it required a CD drive to be in the computers or attached externally. Overnight, CDs were built into almost every desktop and laptop computers. Microsoft was the cause. All the other software companies converted over to CDs relatively quickly. CDs became the standard because of the distribute action.

Zip couldn't become a market standard for the distribute action because it was only 1/6 the capacity of a CD and its costs were far

more. After more evaluation and many more discussions, we determined that the only way Zip could become a standard for computers is by leveraging the move action. If somebody wanted to move some data from one computer to another, Zip was the best solution at the time, but only if both computers had Zip drives. We all loved the book by Andy Grove, the CEO of Intel, Only the Paranoid Survive. He wrote about what he called "inflection points." We believed there was a magic number of installed zip drives that would create an inflection point where Zip would become a de facto standard because it would be obvious to everyone that Zip drives and disks were the best way to to move their data. We didn't know how big the number was, however if we could get into every new computer we knew we would win. The CD became a standard after only shipping 4 million units for computers. At the time of our discussion, we had shipped more than 15 million Zip drives. We wondered if there was a killer software application that needed to move data that would force Zip to become a standard quicker similar to the Microsoft effect on CDs. We couldn't find one. But we were certain but if we got to that inflection point we would receive the standardization prize.

By late 1997, the company had fulfilled its mission to make the storage products the customers wanted, selling them at locations from where they wanted to buy them, and at prices they were willing to pay. We were on track for revenues to top $1.5B, telling us that they wanted our products. Our products sold in all of the most popular computer and electronics retail and catalog companies and at other locations through the world's best distributors. Cost reductions allowed us to reduce the retail price of Zip drives by 25% to $149 so many more people were willing to buy, and they did.

Now you may ask, "Why was becoming a standard so important?" Because once your product becomes a standard, then it's assured of a long legacy of revenue. The 1.44 MB floppy disk was first shipped in 1986 was basically irrelevant by the end of 1997, but continued to ship in computers for another 10 years, though in diminishing quantities. There wasn't much profit in floppy drives because there were so many manufacturers, but we were the only company to own the rights to the Zip drive, that we would love to get revenues from that product for the next 20 years

without having to make any significant improvement to it. Sony, one of the big manufacturers of 3.5 FDD disks had their biggest sales year in their fiscal 2002 year with 47 million units. In their fiscal year 2009 they still sold 12 million. They continued making these until March 2011.[2]

There is a second reason why we needed to become a market standard: technological threats. We knew that eventually the 700MB read/write CD drive would be available for $50 in retail, and the disk would be less than a dollar a piece. Zip could never compete with that. Not far in the future, flash memory would have large capacities at tiny prices and could be packaged into USB configurations. Worse, someday in the not-to-distant future the network within a company and the Internet between companies and individuals would be fast enough that people could move data without buying anything. Therefore, we had a short period of time to become a standard and create a legacy before the emerging technologies would make us irrelevant.

There was scientific research that was applicable to our question about how many we needed to put into the market to become a standard. Metcalfe's law describes network dynamics that would include our move action concept. It provided us a structure for our thinking, but we still couldn't calculate that inflection point in terms of quantity with any reasonable confidence. Some guessed the magic number is about 17 million, some 20 million, others 25 million. The most pessimistic of us, including me, argued that it wasn't the quantity so much as the users' behaviors and expectations—if almost all computers came with Zips built in then people would start acting as if they should all be using the disks. I suppose the simplest way to describe my guess was this: "If it's everywhere, then people will believe it should be everywhere." Tony remained unsure what the answer was, acknowledging it could be any of those answers and we'd just need to keep pushing in all directions. His opinion was probably best summarized as "we'll know it when we see it."

To get to that point of standardization, we made two related strategic initiatives. The first was to license the manufacturing and sales of Zip drives to well-known branded companies to create a Zip "eco-system." These licensees included Epson, Matsushita Electric (Panasonic), and NEC. We had two goals with this initia-

tive. We wanted success with Computer OEM customers, such as Gateway and Toshiba. They needed to rely on Zip being a major force within the market. In other words, these partners' brands would add value to the Zip name. We also wanted these partners to help us get Zip drives built into well-known personal computers. They had relationships we didn't and even those OEM customers with which we had a relationship wanted a second source for the component to strengthen their supply chain. We might lose some of our direct Zip drive revenue this way, but we expected the licensee partners to sell to more drives to customers that couldn't or wouldn't purchase them from us. It really didn't matter who sold these drives because we made the vast majority of our profits from disk sales, and would never license those manufacturing rights to anyone.

The second big initiative coincided with the first but was managed separately for legal reasons. The company made a concerted push into desktop PC OEM customers like Dell and Apple, and later into laptop OEMs like Toshiba and IBM. Because of that design change created by Kim's last moment challenge before Comdex, the Zip had a front-loading mechanism that allowed it to be configured for internal use in PCs and miniaturized to fit into laptops. A great product manager named Mike Lynch headed this effort along with some very good OEM salespeople. For a company that had never sold items considered to be components, Iomega's initial success was reasonably good. We faced new challenges because the quality standards for these customers are much higher than for end users. In the retail world for our product category, a return rate of 1% or 2% was very good, but for OEM customers it's unacceptable. The requirements they gave us ranged between 100 to 1000 parts per million with defect, which corresponds to a return rate of .1% down to .01%. That meant we had to be 100 times better at quality to make those sales.

We faced an even bigger challenge though. It was the unexpected tightening of the OEM's total cost budget for their computers. The timing of our OEM launch coincided with a huge shift in the market where the average price of a fully configured personal computer dropped from more than $1500 to less than $1000. For the previous 15 years, the typical personal computer's price was always about $2000, but then within six months expectations

changed so dramatically that every dollar of cost for computer configuration was a big issue for OEMs. We needed these companies to help Zip become a standard, but they would only include Zip in all of their systems if they perceived us to be a standard AND the cost didn't impact their new retail price points.

Our first announced deal was with Hewlett-Packard. Initial OEM pricing was $49, but the volume wasn't close to what we wanted. HP put it in a computer that wasn't their most popular. Several top computer companies offered internal Zip drives in a limited number of their higher-end/lower-volume models, and some offered it only as an add-on option. We hit the perfect opportunity for which we had been searching: Dell promised to make Zip a standard component in every computer they sold. There was one catch. The price they paid to us had to be no more than $18. At the time, the cost of goods of our OEM product was about $24. If we sold it at that price, most OEM computer companies would dramatically increase the quantities they purchased.

We could do one of two things. Option 1 was to lower our pricing so that we could fit into their system budgets and hope that most of those users bought some disks. We'd break even if each of those computers' buyers purchased at least one Zip disk and a profit if they bought at least 2, but there wasn't any guarantee on that. Option 2 was to try to create enough demand by end users so the OEMs would pay $24 or more to be included in all of their products. You can imagine we had many strategic conversations that included the words, "chicken" and "egg."

In the last few days of the calendar year 1997, our VP of sales and CEO decided the best strategy was to go with Option 2 and tried to change the world's perceived value of the Zip. If everybody walked into Circuit City and Best Buy and said, "I want my computer to have a Zip in it," or "I need to buy a Zip to go with my new computer" then computer companies would find the extra $6-$10 dollars to put it in as a standard component. Kim and the VPs of Sales and Marketing created a plan they called GO, standing for Game Over. It was decided to increase our global advertising budget by more than $100 million starting with three 30-second spots on the Super Bowl which was less than a month away from the decision. Almost all of the GO budget had to be committed in the first 30-60 days of 1998 to ensure we could have

the print, radio, and TV spots for the year. It was a bold and risky strategy. If successful, it could change customers' demand and create a huge sales spike now and add at least 10 years of legacy revenues. If the extra advertising didn't work, then it would just be a big waste of money without any return. It was a $100 million bet based on opinion and approved by the man who had earlier emphasized the principle of validating ideas in the real world (testing the Zip usage at the school).

The Denver Broncos beat the Green Bay Packers 31 to 24 points in the Super Bowl in San Diego on January 25, 1998. Less than four weeks after the Super Bowl, the data showed that Iomega's advertising game had been beaten far worse than the Packers. The GO plan was stopped as quickly as possible, but it had already spent almost all of its funds. In about two months Iomega big advertising game was indeed over. Within another month, Kim Edwards was fired. The board appointed one of its members to be an interim CEO, but he didn't want to make any big strategic changes while in charge. A new CEO was hired in October. He was fired the following August. Even after selling more than 25 million Zip drives, Iomega never reached full standard status with the legacy payoff.

Turning Victory into Defeat

The big mistake the company made wasn't so much the failed GO program, but by not defining the next mission for the company with corresponding objectives. It had worked when the company was desperately in need of direction, but once that million was fulfilled it was replaced a goal to "maximize shareholder value." Eventually, a fancy banner of company values went up in the lobby of our new headquarters building. I didn't know for sure, but I guessed that the public relations firm or ad agency created it. I'm not aware of any employees who cared about it. No one memorized it or based decisions on it. Without a real mission pointing the strategic direction, the rush was for revenues and profits as an end unto themselves, and standardization was seen as the best way to maximize those. Zip had saved the company, and energies were primarily behind finding ways to milk more sales and profit from it.

Iomega was a big company now. From end of 1996 to the end of 1997, the company increased its employees by 64.6%. Kim's "standup" meetings were long gone. Hallway decisions evaporated faster than a drop of water in the hot Utah summer sun. There began to be meetings to get prepared for meetings. There was even an incident involving vice presidents arguing over the relative size of their offices. That kind of energy expended over non-value-generating activities could never have happened three years earlier.

The company was broken into three divisions, one each for Zip, Jaz, and Ditto. Three men were promoted to Divisional Presidents, and the ripple effect of title inflation propagated through the company: directors became vice presidents, so managers were promoted to directors, and duplicative positions appeared in each location. Each division needed a CFO, for example. It was decided that divisions should become "centers of excellence." A small R&D group in San Jose became the headquarters for the Jaz division. Several people moved out and were hired there. The same thing occurred in San Diego, home to Ditto and later a new product called n*hand. In the most significant enhancement, the Zip division, was established in Longmont, Colorado, a town known for having several computer storage companies. This required many to be relocated 500 miles (804 KM) away. They weren't just building silos that blocked the communications and collaboration of different teams, but it was more like they erected castles with motes hundreds of miles wide. In general, the feeling was that the divisions didn't want anything from the corporate entity except for resources and branding support. If the Zip engineering team created a breakthrough in their development, how would they share it with the Jaz and Ditto groups? Three years before, they'd just walk across the hallway or share it with their friends at lunch, but after the reorganization formal meetings needed to be scheduled if the sharing happened at all. The management and other meetings between the entities were difficult to do over the phone. Regular travel between the four locations (and Malaysia) became common. Just a few months after moving the Zip people to Colorado, I heard some division management lobby for the corporation to buy them a private jet to simplify their trips to meetings at headquarters.

The siloed communication reached maximum difficulties very quickly. A short story will demonstrate. I had a great employee, Bradd, that we moved to Tokyo with his family. He spoke beautiful Japanese, knew all of our licensee contacts there, and acted as our in-country first point of contact. We gave him all of the trust and accountability to act independently because he understood our team's goals. We wanted someone who could solve problems without needing to wait for the clock to move enough to check in with headquarters. I arrived in Japan to visit some companies with Bradd, when the newly appointed head of Iomega Japan asked me to his office. He told me that he wanted to improve the relationship between his organization and mine. I told him that he should start with Bradd, who was on the floor just below him. His response was that Bradd was just a manager; since I was a director, he wanted the relationship with me. We had another member or our group, Mr. Kaneko, who reported directly to Tony, but worked very closely with my team was also in the office. He was a respected storage pioneer in Japan that Tony recruited at about the same time that I joined. Kaneko-san was my secret weapon for collecting unpublished gossip about key people and companies in Asia, and to make appointments for me with just about anyone I wanted there. He was an incredibly valuable asset. He was likewise ignored.

I told the executive that if he was unwilling to have a relationship with my team members that we paid to be in Japan specifically to be liaisons, then we had much deeper problems. I made it clear that Bradd and Kaneko-san were empowered to act for me in all matters and if he didn't show them respect, then I'd consider that disrespect for me and Tony's entire organization. It was about this same time that we found emails from the head of Asia operations telling his people to not spend any attention or cooperation with my organization when we were in "their" territory. Fundamentally, they saw teams as competitors and not collaborators. In fact, on one trip to Singapore, I was told that I wasn't welcome in the company office because everyone was too busy to entertain me, even though I only wanted 16 minutes to log into the company intranet to retrieve my email. All this foolishness was denied later because it looked so petty and bad, yet those were the circumstances. Each of the divisions and the regions fought

for budget, bragging rights, and attention seeing everyone else as challengers for their resources and praise. My organization was somewhat inoculated from this problem because we weren't in any of the divisions or geographical regions and focused on non-day-to-day activities. These different groups often asked for our assistance to close sales solve other customer issues, which we did without hesitance. But there wasn't any assistance in return unless we pulled political strings.

Sadly, the results showed that the Iomega Japan performed better when it was run by Mr. Hama, one of my best friends in the company, several years earlier with very little help in a small office in an affordable neighborhood. Now that the company had more than thirty people in a big office in an expensive area of Tokyo. Empire-building did just that: it built a large organization but failed to improve sales. Hama-san was still in the office, but the new Japanese, then later, American executives failed to listen to his sales advice or use his expertise. Management seemed to care more about the size of the organization and swankiness of the digs than business outcomes.

The Ditto division got a fancy name and launched a new product that was originally called n*hand, renamed to Clik!, and finally PocketZip. The device was basically a very small Zip drive based on the same technologies in miniature. In the late 1990s, smaller handheld devices became popular. We anticipated that digital cameras would become popular. The primary limiting factors were the low resolution of the CCDs (charge coupled device—the chip in the camera that converts light into digital signals) and the low-capacity storage options (the digital film). We estimated that digital cameras could become a desirable choice for most people once the CCD reached a megapixel (one million pixels) in resolution. The storage for the camera had to be big enough to store 34-36 of these at a minimum, and preferably this memory should be removable, just like taking film out of a camera. This new device was created to be digital film for cameras and removable storage for other devices like digital music players, and PDAs (personal digital assistants). We also believed that there was a value to move this kind of digital stuff between these mobile devices and personal computers. If we could get acceptance fast

enough, perhaps there was a standardization opportunity in this new market.

Again, the idea of an inflection point of standardization was foremost in our minds. We needed to get into the most mobile devices as quickly as we could so the move action would create de facto standardization. Clik! had a few problems. First, it was too big for many mobile devices. It had a relatively large footprint, but the more critical issue was that it was too tall at 6.5mm. The computer industry defined PCMCIA type II slot that most laptops and many desktops already had it. It was 5mm high. This same requirement was given by many device OEMs. The second problem was energy consumption. Click! didn't use too much, but it did have to spin a disk and move a head across it so the requirements weren't trivial. Lastly, the capacity was fine for current requirements, but several customers wanted to see a roadmap to higher capacities. For reference, the typical music album converted into the new MP3 format required about 32MB of space.

At the time, competition wasn't very intense. There was a camera that used a writable CD drive in it. Sure, the capacity was much higher, but the size and power requirements were huge. We knew that, someday, removable flash cards would become a viable, then a superior, option, but at that time capacities were far too small to be considered then. Almost all mobile products wanted a removable option, but without a viable solution that acted like film, they used internal flash memory and a cable connection to download the photos to a computer.

Some were critical within the company that the Clik! drive was just a quick attempt to get into the market without the effort to give the market what it really needed. If our old mission of providing customers with the storage products people wanted where they wanted them at a price they were willing to pay, then Click! would have been smaller with a higher capacity and suitable for the OEM products or it wouldn't have been built at all. Yet there it was. Since the Ditto tape line was being phased out, the entire division's life depended upon this product's success. Those more bullish on Clik! said it was a way to extend Zip legacy and create value to shareholders based upon the company's previous investments.

1998 was a pivotal year at Iomega. The company had three CEOs within eight months. After being Wall Street's darling for a while this would be the first year of declining revenues since the Zip's announcement. There were a few highly hyped alleged quality problems with Zip and Jaz products. Online stock websites, most notably the Motley Fool, wrote scathing articles about the demise of Zip. Their arguments were very basic:

- When Zip was introduced at 100MB the average hard drive capacity in PCs was somewhere between 300MB to 500MB, but at the close of 1998 the typical new PC was shipping with hard drives with capacities around greater than 1 GB, with many having capacities between 6.4 and 8.4GB, making the Zip disk less valuable.
- The company had made progress, but there wasn't confidence that de facto standardization was possible, let alone inevitable as many investors thought just a year previously.
- The new leadership hadn't shown the decisive moves necessary to move the company into another hyper-growth period that would justify the stock price's price/earnings ratio.
- The only new product in three years, the Clik!, was for a nascent market and had only negligible sales.

The following is a posting from a year earlier at the height of sales that signaled the shift in analyst and market perceptions of the company:

> Even if I concede that Zip will be a "standard" for the next two years, what happens when the winds of technological change blow forward as they always do? World-beating companies constantly reinvent themselves and I have yet to see Iomega break any cocoons. What have I seen come out of Iomega's R&D department the last two years? OEM Zip drives . . . Zip for notebooks . . . new Zip transformers . . . bootable Zip drives. Seems this band knows only one song and can only put out remixes of its one chartbuster.[3]

At the end of 1998, the attacks were much more abusive. It was about this time that Iomega was the most shorted stock on the New York Stock Exchange, so negative writers were expected, hoping to push share price down to cash in. We felt inundated with negativity. Zip sales were still strong. The Iomega brand was

strong. And while we burned up most of our cash in the GO plan, Jaz was having some quality (real and perceived) difficulties, Ditto was going away, and Clik! didn't have many immediate prospects. The company was still fundamentally and financially sound. However, it was also without a real strategic generation.

Seeking a New Strategy

About this time, the new president of our Japanese subsidiary, visited the headquarters and visited Tony's office. I hadn't expected to join the meeting, but shortly after they started, Tony asked me to come in. He asked our guest what the plans were for Iomega Japan. The response was "Sell more."

Tony asked, "How?"

I don't recall the exact answer but it was something like. "Work harder to sell more."

Tony frowned with disappointment. He turned to me and said, "James, could you please show him what a strategy might look like?"

I walked up to the whiteboard and listed the largest retailers, PC OEMs and private-label computer peripheral companies in Japan three columns from biggest to smallest. I said something like, "Focus in on the three top companies in each category with a customized game plan for each and you should have the success you need." He was polite, thanked us, and left the room. "Do you think he'll take what I gave him and present that at the board meeting in three weeks?" I asked Tony.

He said, "I hope so. And if he does, we won't tell anyone that we gave it to him. We'll praise him and support him in it. We need his organization to have some success." We needed the overall company to have a better/new strategy but selling what we had was helpful for any future.

Three weeks later after the board meeting, I asked Tony what our Japanese friend presented as his sales strategy. Tony disappointedly responded, "Sell more."

I included this little story, which is inconsequential overall, to point out a symptom at the company. When the money is flowing, one's office is nice, and the perks abound, and it's easy to not challenge oneself or for a company to not be willing to look at challenges afresh. It's easy to just optimize. Only four and a half years

previous to this moment, Tony and a few others were assigned to question everything and recommend the right thing to do. But now the board and CEO wanted to just "sell more." Zip was a fantastic product at the time it was introduced but times were changing fast. At that first Comdex, very few people in the world had heard of the word "internet." In late 1998, we were entering the internet boom. People were using their computers very differently, and yet the company expected to continue doing the same things and grow. The board wanted to grow, but it wasn't interested in making any big changes in the company direction.

Tony's group was called Strategic Business Development. We decided to do that. We proposed a new company Mission and began developing the ideas for the products and services that would be associated with it. We did so as if we had Zip in our back pocket but understanding that it didn't have to be part of our proposed solution. In Tony's words, "If you have an ugly baby, be sure that you are the first one to recognize it." He meant that companies love their products because of all the effort it took to birth them, and the care and effort to nourish their sales. They think it's the best product ever, without regard to what their customers may think. No parent says "My baby is ugly." They love him or her too much. Most companies won't admit their products aren't right for the market for the same reason. Zip was beautiful in 1994 and 1995, but by the beginning of 1999, it was getting ugly.

Our proposed new Mission for the company was, "Help people Get, Store, and Use their Digital Stuff." We used the "verb" analysis tool that George Meyer created for looking at data usage and expanded it to look at "things people wanted or needed to do" in a much broader arena: their stuff. In our customer research, they consistently used "stuff" to discuss the things on their computing devices. We were big fans of the book "Crossing the Chasm" by Geoffrey Moore that was published in the early 1990s. We realized that the consumer market as a whole was just then moving from the early adopter phase into the "Early Majority" of personal computing and these new customers people weren't very technical while doing much more than earlier customers. They didn't know that a digital version of a standard definition two-hour movie required just over four gigabytes of storage. They just knew that they wanted to watch a movie. If they wanted that movie to look

good at home then they might buy a new DVD player, which was just entering the market. I seem to recall someone on our team asking, "How many DVD buyers know the storage capacity of a DVD disc?" Another answered "The square root of zero." The same went for this early majority's understanding of how their cell phones worked. They didn't want what we called "speeds and feeds" (technical specifications), but they just wanted things to work easily and to be inexpensive.

The more we dug into trends in technologies, the things that customers wanted to do, and how they might match up, we began to create an integrated view of the future and how Iomega could step from $1.5 billion in sales to $15 billion in the next four years, with the potential of moving up to $150 billion after that. If Clayton Christensen had published his Job's Theory before then we would have had a more structured approach and a better vocabulary to describe what we were doing, but that's basically the method we used. We asked, "What do people want or need to do?" Then we asked, "How could a digital approach help them do it better and make them happier?" and "What technologies would we need to make it work?"

The Zip division was in optimizing mode and wanted to sell more, so they planned to release a 250MB version of the product. They thought it was a big deal, but with the new thinking in our group we asked the question, "What will the 250MB Zip do for me that I couldn't do before?" The answer was "nothing." We then asked, "How big would a Zip need to be to do something new for me that I want?" First, thinking about move, backup, and those other uses, it would need to be as big as a typical hard drive and probably somewhat bigger so that it would remain useful as those continued to grow in capacities. We concluded 1GB was the minimum size, but 5GB would allow people to play a movie and that is something that someone in the majority of the market would like to do. When we mentioned that a 250MB Zip was a wasted effort and that 1GB should be the minimum acceptable size the answer was, "We can't make a sub-$200 drive with flexible media hold 1GB." It was strange how that conversation affected two groups so differently. The Zip division forgot about our conversation, or maybe even laughed at it. At the same time, we became convinced that flexible recording media was ugly and needed to be replaced.

It may have been Iomega heresy, but once we all admitted it to ourselves our strategy exercise became much easier.

We looked at many different aspects of entertainment, communications, education, information distribution, and other markets. I remember when one member of our team, Bill Tolson, presented to us the concept of time shifting and how many different possibilities there were to fill people's needs. That motivated us to identify even more potential areas for investigation. As an example, I remember leading a discussion about how software could change in the future when the internet became ubiquitous and faster. We all concluded that only small applications would be local while the bulk of the code and the data would be remote. We didn't use the words "app" or "cloud"(although we did draw the amorphous infrastructure as a cloud-like object on our whiteboards) but we began envisioning how an app-centric world would look. Mobility was also something we expected to be a key component of the future world. We did case studies of a few companies and products that interested us and tried finding ways to apply it to our analysis. We also considered the transitional period as in: how do we finance moving the company to an entirely new approach to consumers with the stuff we have now. Finally, we embraced the approach found in Guy Kawasaki's book, "Selling the Dream" wherein he laid out the structure of a coherent strategy: mission, objectives, strategies and tactics.

We believed that our proposed mission would be valid for at least 5 years. We changed the wording around from time to time, but it was "Help people Get, Store, and Use their Digital Stuff" with an emphasis on giving them good reasons to convert from the analog to the digital world. When people asked, we said that the proposed new mission is 'to let people use their stuff." Our plan was broken down into several interdependent categories.

1) Improving the performance of current products. Our primary concern was Clik! We were able to make a joint development relationship with Citizen Watch Company to improve the design. Iomega experts said it was impossible to make a Clik! drive that was only 5mm high. Citizen demonstrated a working 5mm unit only 6 weeks after signing the contract. It shipped to customers just a few months after that. We also did a similar agreement with NEC to create a simple USB-based version of the Clik! that could

be used with any computing device. Both of those improvements were done at virtually no cost to the company.

2) Entertainment. The rest of the company knew of this effort as "Record/Play." (notice the use of verbs in the name) That portion name only covered a subset of activities to get people to use Zip for their digital music. We invested a significant amount of time in recording industry executives. They had just experienced their napster.com situation where people did what they called file-sharing (distributing their digital music files with anyone on the website) but what the music industry called copyright infringement. We made the following progress in this area:

- Working with the best internet security consultants, we created an encryption system (and filed for the patent) that would be transparent to rule-abiding customers and prevent illegal "sharing." It was elegant. We designed the system looking at it from a consumer's point of view, and ensured it fit the requirements from the rights owners' perspective. The only requirement that the security system needed was a unique serial number on the device that stored the downloaded music. That could be the ID on an HDD in a computer, a serial number build into the electronics of a portable music playback device, or the identification number on every Zip and Clik! disk.
- I made what I believe to be the first agreement for the sale of rights-protected music on the internet with a major record label. Warner Music agreed to test out the system selling digital albums online and offering individual tracks for $0.99 each. They had an online property, www.cdnow.com, that we'd use for the transactions and downloading. IBM offered up their servers and networking equipment for the pilot. Panasonic agreed to make the first portable players compatible with this system. Iomega would provide the security technology. There were other companies involved in the support infrastructure. The handshake to confirm the deal was done in the late summer of 1998 in an office at a Rockefeller Center building. We had enough time to launch right in the Christmas buying season of 1998. Within a matter of days, the other four major record labels all verbally agreed that if

the Warner pilot was successful that they wanted to get in on the action.

- Separately, Sony Music agreed to endorse the Clik! drive if we demonstrated the security and got its capacity up to 80MB. They wanted it to store two albums. There were talks of multiple partnering opportunities, but at a minimum they'd promote it from their website, negotiate a distribution deal, and do co-branding on the products.
- Electronic books and secure documents. We anticipated that the mass market would one day be happy to read their books on a computer screen or a book-sized tablet in the future, but they weren't ready for that in 1998 or 1999. We'd need to go through an early adopter phase. The job that needed to get done was for someone who needed to obtain a book quickly, have frequently access it, mark it and search through it. If we could do it while saving them time and money it would be a great bonus. We anticipated that the place to start would be with college students and their textbooks. Young people accept new electronic technologies faster. The search and copy/paste capabilities of what we called "electronic books" would be a huge advantage to the students. It would be nice for the college bookstores that could get revenue without having the burden of inventory costs. NEC agreed to donate up to 60,000 book readers that also had keyboards. These devices ran on the Microsoft CE operating system, looking very similar to a normal 10-inch (25.4 cm) laptop. While it wasn't the tablet-style device we wanted, it did have some advantages. First, it was available to ship immediately. Students could use the same device to read the books and take notes, but most importantly, it had a ten-hour battery life. NEC promised to build book-specific readers if the pilot showed promise. We expected that after four years, large quantities of normal people would warm up to downloading books over the internet and reading handheld electronic books. We also knew that the reading experience had to remain somewhat similar. Though it was going to download books from the internet via e-commerce and show the text and images on a digital screen, it had to be operated physically like reading a book or a newspaper, i.e. turning pages. We spent a lot of

time trying to invent a way to replicate the page-turning action. We never tried swiping a finger across a touch screen. It may have been because touch screens were so low in resolution then; regardless, we had identified that page-turning motion as a must-have capability for mass-market success.

3) New Products and Services.

- It was a very simple choice and opportunity. Tony received a package and handed it to me. It was a solicitation for the sale of Quicktime®. We probably could have purchased it for about $2 million. It was a no-brainer decision if our mission was to help people get, manage, and use their digital stuff. It may have caused some tension with our buddies at Microsoft's Windows Media group, but it would have instantly made Iomega a player in digital media. It could have been one of the core enablers for some of the other schemes listed above and below. It would also mean that we could do a full implementation of them without having to pay royalties or depend on someone else. The company rejected it because it didn't see the value in a software product that we would give to end-users for free while adding the cost of building a media software group to do maintenance and enhancements. From the board's point of view, software wouldn't fit into any of the Zip, Jaz, or Click! Divisions. This little data point is also interesting because it shows that at that time Apple wasn't sure what it wanted to do.
- We gave it the code name "OZ," which got its name because it was a new glorious world into which we could move and because the letters stood for "Optical Zip." Working with our small group of advanced R&D led by Brent Watson, we put together a plan for a high capacity read/write optical product. The specs were pretty simple: it had to be big enough to record a standard definition movie. It also had to be fast enough to write one piece of video while reading another. It must include a unique serial number to fit into our encryption scheme. Lastly, it needed an extensible storage technology to allow for future larger-capacity, high definition movies. After gathering pieces of technology from here and there, some ingenious in-house invention, and putting it all together we had something that looked really good. We needed

to turn it into a high-quality product that could be shipped to the mass market. Our advanced R&D group working on OZ was small. We needed help to get from proof-of-concept to a product on the shelf. Building that expertise in house might take way too much time. We needed an experienced optical partner with an entertainment product reputation. On my next trip to Japan, I met with a senior technology person at Toshiba for lunch at their Tokyo Headquarters in a tonkatsu restaurant on the bottom floor. I asked him if they were happy with their membership in the still-new DVD consortium. They weren't. There were too many manufacturers and too little volume at the time for them to make profits. At the time, DVDs were read-only and the road map for a recordable disk was convoluted and under debate. It looked like DVDs would overcome VHS as the standard for movie distribution and playback in a few years, but it wasn't a sure thing yet, especially with the high prices of the devices at the time. I asked my friend what specifications he believed the video market needed. He wrote them down on a napkin and handed it to me. His list matched ours. I asked, "What if I told you that we had that product working in our lab right now?" He said that they'd want to partner with us, drop out of the DVD consortium and apply their entire optical lab to help us get it ready for the market. He also said that he could take me up to the company president on the top floor right now to work out a preliminary agreement. I thanked him for the enthusiasm but told him that my board of directors hadn't approved such a negotiation yet, but I hoped to be back within a few weeks. We could have launched that product in time for Christmas of 1999 with a retail price of only $199. We had a good shot of displacing the DVD before it became a standard.

- We wanted to start online storage services. Our advanced software people were ready to start on it. We thought this was pretty obvious. People would need to have access to remote stuff as they became more mobile and worked in distributed groups. As high-speed access became more available, network-based storage seemed the least risky offering in our mix of new ideas.

- Set-top boxes. Since our TV set-top box was internet based it meant that eventually content owners could serve up their stuff without the need for cable services. If you wanted to see a movie from Universal, then you could go to the Universal website. A new sitcom from ABC would be on ABC's web location. If you wanted to see a rerun of Gilligan's Island, then you could go to GIsland.com. We expected that some aggregators would spring up offering multiple properties. Profits would be generated by these sites either charging a fee or showing advertisements. The full model included built-in storage for DVR functionality and an OZ drive. The OZ would be a big deal as soon as internet speeds allowed us to download a full video faster than it took a customer to drive to/from a rental store or to one of our kiosks (see below). Users could master their own movie disks either for rental (including taking it out and driving over to a friend's house to watch) or to purchase for one's video library. The movie could be added to our online storage eventually to create video libraries that could stream. In this move, we, along with partners, would replace cable companies, video rental companies and the need to buy physical movies from stores.
- Video kiosks. We wanted to download or stream videos right to a set-top box in the home, but in 1999 there weren't enough people that had high-speed internet connections. We could make a Kiosk consisting of a touch screen user interface, a credit card slot for payment, one of our OZ drives inside to master desired videos on the fly, some local storage with the most popular videos, and the internet connection. We'd place them at locations with high-speed connections so we could download new titles. We thought we could partner with someone like supermarkets or fast food restaurants. Anyone could get a disk with almost any movie they wanted either to rent or to buy.
- We were working on a new product concept originated by Gary Nelson, a gifted electrical engineer who was on loan to my group for a while out of San Diego. It all started out as a comment he made as we discussed the difficulty in getting film companies to switch to digital. He said, "We should just connect the camera directly to internet storage

over the cell network." I had just finished doing a case study on Qualcomm, and was playing daily experimenting with a Microsoft CE-based PDA. We started working on the concept of a handheld camera/phone/PDA/music player product concept. During a strategy conversation on this topic, Tony got animated and asked, "Why didn't we buy US Robotics? We could have picked it up for a song. They were located just down the road, weren't they? The Palm Pilot could be the basis for a lot of the things we're saying that we want to do." If we had developed our thinking six months earlier about how to identify what people need to do, we could have seen that opportunity.

4) Reworking the corporate structure.

- First, we proposed that we sell off our factory in Penang Malaysia. I personally promised the CEO that I could sell it for at least $40 million for it and do it relatively fast. It was a gorgeous facility in the same neighborhood as Dell, HP and others and the market was hot then. One problem with the facility was that the quality still hadn't risen to that which we had enjoyed under subcontracting. We wanted to keep our prototype and low volume manufacturing there at the headquarters, but by selling off the factory we could cut the company's size by more than half and improve our flexibility for these other changes on which we were working. My slide at the meeting actually said that doing this would make us "nimble" and "agile." Finance concurred that at worst such a change would be neutral to the bottom line, but there could be nice cost savings. We knew that as long as operations were furiously trying to keep the factory at full capacity, they'd never support considering new products that included software, internet-based services, or was in partnership with a branded electronics company who would do the manufacturing. In that proposal, I brashly said that we needed to make the right products and services for our human customers, and not base our choices the factory's needs.
- Our view was not to add any of our cost unless we were adding value or producing very high profit margin products. This fit in with our desire for agility. This meant that instead of a company that derived its revenues from making and sell-

ing lots of hardware, we'd shift to a company that generated most of its revenues from royalties, software, and service and subscription fees. We wanted the majority of the profits from the sales of the OZ to be the recording media so we'd sell. Our proposed deal with Toshiba was that they'd build most of the devices and we'd only put the Iomega brand on some of the units for computers. The revenue model was very different with a huge portion of the sales coming from subscriptions, recurring royalties, and disk sales.

To give you some reference for the size of the opportunity I'll provide you with some market sizing data (except where identified, the numbers are for only the United States):

- Book market, 1997: $21.3 Billion
- Video Rental, Rev. Q1-3,'98: $6.5 Billion
- Video Rentals, Q1-3, '98: 3.08 billion units
- VHS tape Sales, N.A. '98 est.: 960 million units
- WW Music Sales, '97: $38.1 Billion[4]

We were hoping to get 2-4 cents for a good portion of each of the digital version of those transactions in those markets in the future.

5) Influencing market leaders.

- We sent people out to Kodak to try to convince them to convert their efforts to digital cameras. Sure, we wanted to sell them Clik! in the short term, but in general we knew that we wanted to accelerate the rate of change from analog to digital. We entertained making our own camera to speed things along but decided working with existing experts was a faster way to make a difference.
- We maintained a strong presence with record labels and movie studios providing whatever encouragement toward digitalization we could.
- We joined several ad-hoc and permanent entertainment industry groups to get our vision out there

6) Risk mitigation moves. Along the way, we proposed to move forward with some significant acquisitions of companies that posed a potential threat to our products in the near- or long-term futures. The list below includes the deals we wanted to do the

most. Our stock at the time of these proposed deals was worth about $5 billion, so we could finance the deals relatively easily.

- Imation had just over $2 billion in sales in 1998. It was a media manufacturer and seller. They made rewritable CDs, magnetic recording media that could qualify for our Zip and Clik! disks, and other products in the category. They were steady but their net profits weren't great. Their market capitalization was about $2 billion. We believed we could get them in an amicable deal for no more than $3 billion in a stock swap, and that Wall Street would value the combination. This idea was turned down specifically because the board thought that this "boring" company would pull down Iomega's share price because it would reduce the buzz around our market caché.
- Sandisk. We understood the math of Moore law of semiconductor advancement. Eventually flash RAM in a removable format would be bigger than any Zip or Jaz product and it would be smaller and use a tiny amount of the energy. We created charts that forecasted when flash would catch up to us and make removable rotating media irrelevant, and then when it would start replacing HDDs. (Those predictions turned out to be quite accurate) It was inevitable that handheld devices would switch to these technologies once the storage capacities got big enough. Sandisk's 1998 revenues were only $103.2 million, but they were growing. We hoped that we could acquire them for $400 million but thought it was a good bet for the future, even if we had to go as high as $600 million. In the 2000s, SD cards and USB flash "thumb drives" became far more ubiquitous than Zip drives ever were.

Summary

We presented our plan to the CEOs over the course of 1998 and 1999. Their responses ranged from mild interest to incomprehension about why we'd change so much. Our pending relationships with partners and technology development timetables were becoming critical. Tony presented directly to the board to push the issue to a conclusion. We got a definitive answer. The board killed

all of our proposals. David Dunn made two comments worthy of note. First, he mockingly questioned rhetorically, "Who'd ever buy digital music?" The second statement was aimed more broadly at our new strategy: "We are a Zip company!" He went on to question why after almost 20 years of being the best at working with rotating, flexible magnetic media our strategy group proposed leaving it behind. That board decided that the company should spend its time and resources doing two things: (1) trying to sell more Zip-based products and extending their product life cycles, and (2) taking advantage of the company's brand and retail channel by selling private-labeled products in the same space such as an external CD writer. Some people from my group including Jared Christiansen and others within the company did all they could to be successful with that board decision and maximize shareholder value. They kept pushing the boundaries as much as possible including an Iomega branded flash drive a few years later.

Tony and I both left the company within 6 months of this edict. I left first. I called Tony after I heard that he had departed. I asked what put him over the edge. He said, "I was tired of having the same argument with [the chairman]." I predicted at the time that the company would be dead within 5 years. I was wrong, but not by much.

The company's market capitalization hit its maximum of $7 billion in late 1996. 1997 saw its highest revenues of $1.7 billion. Revenues decreased slowly at first then fell off the table before finding a new plateau between $230 and $330 million. The company was purchased by EMC in 2008 for an enterprise value of $128 million. EMC really just wanted the brand and what was remaining of its channel for their low-end storage products.

Since Then

Hindsight really isn't 20/20. You might conclude that the strategies we proposed would have lifted Iomega to at least $15 billion and the center of mobile devices and entertainment markets today, but it's impossible to say that we would have executed things correctly. We would have needed the right leadership, learn as we went, and flexible enough to correct our course when we found we were going in the wrong direction. Would we have been seduced by our new success so as to become blind when our one or

more of our new babies became ugly? It's impossible to know if we would have taken over the DVD and Blue-ray markets, become an earlier version of iTunes, Netflix, Rhapsody, e-books, smartphones, and broken up the cable company's hold on TV content delivery.

There are a few details I do know.

Dell Computers purchased EMC in 2016. It appears that the Iomega brand was used through at least 2012, but I couldn't identify when it died. It is not used with any current products today.

Just after I left the company in late 1999, NEC visited Iomega and presented a prototype 80MB Clik! drive, just like the music industry wanted. They offered to give the technology to Iomega in exchange for a manufacturing license on the drive—not the disks. Iomega decided that they didn't want to give a license to NEC to become a competitor. The Clik! product was renamed Pocket Zip! and died a premature death at a 40MB capacity.

I'm not aware that the Penang factory ever matched the quality from the previous contract manufacturer. In October 2002, I had a layover in Atlanta while returning from a customer trip in Europe with a different company. I read the announcement that Iomega had sold the factory in Malaysia for $10.2 million to a company who also received a sweetheart contract manufacturing agreement. Along the way, Iomega wrote off $10.7 million of equipment. This means they sold it for about $0, or, as a friend later told me, the supply agreement put the sales price at less than zero. It was both sad and amusing to me. I called an old Iomega friend on my cell phone to tell him. As we were talking on the phone about the VP of Operations who fought against the sale of the factory, that man walked right in front of me in the airport. We both recognized each other. I said, "Hello, Scott" and he replied "Hi, James" as he continued walking to his connecting flight. Strange coincidence.

At the same time that Iomega was being purchased for $128M, Sandisk's annual revenue was $3.4 billion, and they had market capitalization of about $6.5 billion. Sandisk has had valuation ups and downs. Its market capitalization at the time of this writing is $15.46 billion. Flash is the standard removable storage media for digital cameras and many other devices. USB-based flash "drives" for moving information from one computer to another (or to a

TV or phone) are everywhere. Solid-state memory is now large and fast enough to replace HDDs. For example, my Apple MacBook Pro uses flash memory-based storage and not an HDD. I'm not aware of any new flexible magnetic rotating storage products.

We didn't think Imation had much upside but would supply consistent revenue in addition to mitigating our media risk for a decade. It did turn out to be consistent, staying almost the same size, $2.2 billion, in revenue at the time of EMC's Iomega acquisition. Even so, during the down market at that time, this "boring" company's valuation was about 5 times as much Iomega at that moment. As of this writing, its successor, Glassbridge Enterprises, has a valuation of $6.0 billion. It sold off the Imation brand name at the end of 2017 to a South Korean company, O-Jin Corporation.

DVD became the de facto standard for the distribution and playback of movies and video games. DVD technology eventually progressed to include the ability to write disks. The first high-capacity Blue-ray products started shipping to customers in 2006. Streaming and download services are popular for music and video from many providers. Apple TV, the Roku device and the Amazon Fire are all quite close to our initial concepts for devices once in-home high-speed bandwidth became common.

End Notes

1) Santa Cruz Sentinel, July 19, 1996, page 21
2) Steven Musil, c|net, Sony Delivers Floppy Disk's Last Rites, April 25, 2010
3) Paul Larsen, Motley Fool, Wednesday, May 14, 1997
4) All the numbers were sourced at the time I presented them to management in 1998, however I've since lost the references.

Chapter 3

The Case for Agile

The airborne invasion of Normandy in 1944 and the turnaround of Iomega in the mid-1990s are two very different events, but it was my hope that I wrote those two chapters in such a way that you could see their similarities. I had to be honest about the events, but I included more details on the things that pertained to our topic of agility. Without applying agile principles, neither the Allies nor Iomega would have prevailed in their efforts. It's hard to imagine what today's world would be today had D-Day been an epic failure. If Iomega had just continued on the "treadmill" of optimization and trying to improve incrementally, it would have died off without too much notice at all: just another tech company that got left behind.

The first similarity that I hoped you noticed was that neither the Allies nor Iomega would have considered making the changes they did had it not been for their respective crises. The second is how the agile principles worked to bring success, and in the case of Iomega, how subsequently abandoning them led to annihilation. Contemplate the magnitude of the Agile benefits for a moment. Why wait until you recognize an existential threat to consider an Agile transformation? Do it now. If that wasn't convincing enough, the rest of this chapter will lay out the argument for the value of agility in today's world, particularly for business strategy and operations.

Let's briefly review how a business begins and executes an important project. The project gets identified by a committee or manager somewhere, and after a series of presentations and budget proposals, someone finally gives the approval that gets things started. Typically, by "started," I mean that a group of people create a plan, timeline, and key performance indicators that must get approved again by someone. The project is assigned to a manager, a project manager is appointed, and things get kicked off. Those preceding sentences have made me bored and worn out just writing them. I hope I haven't lost you. How much of the calendar and meeting time is required at your organization to get from the initial idea to the kickoff for a sizable project? Every day you

don't have your product or service in the market is a day you're not learning what they really need. It's also another day that the customer must consider buying from your competitors or learning how to do without you.

Back when I was young, I worked at structured companies with defined Product Lifecycle Management processes, commonly called the PLC. These were revision-controlled documents that laid out in detail everything necessary for a new product to be approved and developed. At the time, we all thought it was professional and slick. After getting the concept approved by a committee, I had to write up a 25-page MRD (Marketing Requirements Document). If I worked hard on it with my team, we could finish this within two months and submit it to the management committee to review it and get an approval. These meetings were often delayed because it was difficult to get all the stakeholders into the same room at the same time to give an approval. Next, I could start work on writing a PRD (Product Requirements Document) which was usually about 50-75% longer. The first described the need for the new product with market sizing and simple product descriptions. The second included more details including the product's features, costs, pricing. This usually required a minimum of two months to put together and make beautiful. After the PLC committee of executives could get together and approve the PRD, we could finally start what we called the Feasibility Phase where we finally got to do real work: start product design and start to solicit input from real customers. This means that on average we waited about six months before we even started making a prototype and talking to real people about the new product. At the time I was doing this, I was frustrated with the time requirements, but there wasn't really another option working within the corporate environment.

Within three years after writing my last PRD, I was the VP of marketing where I implemented different processes and policies. As a result of a conversation I had with my product management team, I got an idea for a new product. I talked over the technical requirements of it with the VP of engineering later in the day. Within two weeks I was out on a road trip sharing the concept with ten target customers. This new approach became the normal method for new product introduction for myself and hundreds

of other companies at about the same time, independently realizing that the best conversations are those with real customers. The sooner those conversations can happen, the faster you can understand if your idea is good enough for investment, requires significant modifications, or should be tossed out. Why wait six months filled with work and meetings when you can learn what you need in only three weeks?

Let's return to projects in general. After scope definition and approval, someone or a committee of people put together a project plan. This plan will be wrong. Maybe you would prefer "not perfectly accurate" as a description, but every detailed plan will be inaccurate to some degree. For those of you who have been embarrassed because you created a plan that wasn't perfect, I'll pardon you with the comforting information that it's impossible to be perfectly accurate in defining a significant plan. Impossible. I can prove it.

When I have this discussion with project managers, I will ask them how many variables they had to consider when putting together their project plan. They often don't understand the question because they've never thought of it that way. I explain rephrasing the question something like this, "How many things did you have to consider in putting together your plan, such as design options, personnel assignments, resource allocation, timing, etc.?" That's when their eyes roll and I usually hear something like, "I don't know if I can count that high." After a little review of their current project and what's involved, they typically give me a number between 75 and 100.

That's when I teach them about the "Traveling Salesman Problem" or TSP. I learned about this classic mathematical challenge in two classes in college. In Linear Algebra, we dove into the theoretical and computational issues, but in one of my first computer programming classes we used it only as a problem to be solved in a brute force, practical method trying to optimize our coding techniques. The problem originated about two hundred years ago as a practical issue before turning into a math-nerd issue. The problem is simple: find the shortest route for a salesperson who must visit a number of cities and return home. Oh, there is one other detail: the salesperson can only visit a particular city once. It's basically a dot-to-dot game where you try to use the least

amount of ink. To solve the problem, you need to know the number of cities and their relative distances to each other. You might think that the salesperson should just go to the closest city first, then the closest to that one and so on, but that won't always give you the shortest route. It often doesn't. The way to solve it is to try every possible route permutation, add up the total distance for each, and select the shortest one. In my computer science class, we used this specific problem to prove that we could apply a technique called recursive programming. The same code could solve the problem for 3 cities or 20 cities: just enter the cities with their coordinates and the program would try every possible combination and tell the user which sequence was the shortest. It shouldn't have been a surprise to me since I was mathematically savvy, yet the first time that I put in a longer data set I was surprised at the long wait for an answer to spit out.

If there are two cities, then there's only one possible solution: leave from home to that city and return. If two cities, then you could either go to city A then B and return or go from home to B to A and back. But the possible solutions rise quickly as the number of cities increase. It's not an exponential increase, but very close to it. There are 24 possibilities for 4 cities and 120 for 5 cities. It jumps to 3.6 million possibilities for 10 cities.

Let's return now to the project planning situation above. On the low end, project managers tell me that they have to consider at least 70 variables. Determining the sequence of doing items, the levels of investment and the other choices that must be made in project planning is just like the TSP with each of these variables acting as a city. The challenge of making correct estimates is analogous to knowing the locations of the cities. Let's assume that these professionals have a perfect understanding of the terrain of their project. That still leaves the issue of the complexity of the solution. If there are 70 variables, that means that there are 1.19×10^{100} (or 1.19 googol) possible solutions. The fastest computer with the best software couldn't solve that problem within a person's lifetime. If the number of variables is 100, as many state, then the number of possible permutations, 9.33×10^{157}, exceeds the estimated number of particles in the known universe. It would take every computer on the earth about a billion years to get the right answer. To be direct: it is impossible for anyone to make a perfect

project plan, and yet project teams attempt to do so every day. It's the epitome of ignorance or hubris to attempt it.

It's common for parcel delivery drivers with companies such as FedEx or DHL to make more than 100 stops every day. How is it possible that these drivers climb into their vans and depart from their respective distribution centers in an attempt to do the impossible? Well, they don't have to be perfect. They typically have a limited territory for their pickups and deliveries, so the potential up- and downsides are limited. If they are off by 15% from the optimum, then they return an hour late at the end of the day. If an important project at a company is off by 15% from optimum, it could result in the loss of hundreds of millions of dollars, thousands of jobs or the firm's viability. Think back to Iomega for a moment. What if they had kept the top-end loading mechanism in Zip? They couldn't have sold any units to be built into desktops or laptops, and it's possible that the even external version of the device wouldn't have been well received. Instead of $1.7 billion in sales in 1997, it may have been as low as $400 million with investors never becoming enthusiastic in the company. What if Eisenhower had made reasonable choice to take Leigh-Mallory's advice to and cancel Operation Neptune or to direct the invasion at the obvious location of Calais? (Literally, the difference in direction on the compass between Calais and Normandy for the majority of airborne troops was between 13% and 17%, depending upon the points of take-off.)

The very best TSP software in the world can make an estimate within a reasonable time that is between 1-3% accurate. That's pretty close. Is that good enough for your projects? In some cases, it is. But your projects are much more complicated than just the location of cities on a grid. What are the odds that your smartest people can create a plan that is within 3% of optimum by sitting in a room for a few days with whiteboards and project software? Sometimes, 3% is still too far away from success.

An Air New Zealand DC 10 took off on November 28th in 1979 with 257 people from Aukland for a sightseeing flight to Antarctica. Unknown to the pilots, however, someone had modified the flight coordinates by a mere two degrees (0.6%). Dieter Uchtdorf, the former head pilot of Lufthansa explained the rest of the story of flight 901 as follows:

> This error placed the aircraft 28 miles (45 km) to the east of where the pilots assumed they were. As they approached Antarctica, the pilots descended to a lower altitude to give the passengers a better look at the landscape. Although both were experienced pilots, neither had made this particular flight before, and they had no way of knowing that the incorrect coordinates had placed them directly in the path of Mount Erebus, an active volcano that rises from the frozen landscape to a height of more than 12,000 feet (3,700 m).
>
> As the pilots flew onward, the white of the snow and ice covering the volcano blended with the white of the clouds above, making it appear as though they were flying over flat ground. By the time the instruments sounded the warning that the ground was rising fast toward them, it was too late. The airplane crashed into the side of the volcano, killing everyone on board.
>
> It was a terrible tragedy brought on by a minor error—a matter of only a few degrees.[1]

I'll provide you with several examples of business errors of just a few degrees that created relative disasters later in this book. For now, we should agree that in some cases a small error in planning can cause big problems. Anyone with enough experience knows that errors in estimation or plans typically don't cause one-time problems but tend to compound over time. If an airplane were to take off at the equator with the capability and intention of flying around the world but was always off course by only 3%, it could end up as far as about 5,000 miles (about 8,000 KM) from the intended destination. That's an entire continent away!

If it's impossible to have a perfect project or strategic plan, and if being off by just a small percentage could doom you to failure, what's the answer? Correct your course as you go. That's the simplest explanation I can give you for business agility. It's simple and obvious. Take off in the direction based on your best estimate of how to get to your destination, and modify your course based upon what you see and learn along the way. (That one concept is well worth the price of the book, but you should probably continue reading to get more value out of it) It may sound unremarkable and obvious, but most companies today spend too much time creating plans that are wrong. From high-level strategic plans

down to low-level projects, too much time is spent on trying to create the perfect plan and sticking to it: being determined, but inflexible. Budgets based on calendar years or a plan's initial timeline reinforce this lack of agility. Many look at KPIs that primarily measure efficiency. However, this doesn't solve the direction issue. It can improve your speed. Speeding up flight 901 wouldn't have saved those lives, but just ended them sooner. In the same way, it's more important for your business to be going in the right direction than it is all of the other little things that many groups measure. Most companies operate at multiple levels to discourage or prevent a flexible approach to achieving success.

At the most basic level, many if not most companies can't properly course correct because they haven't properly defined their destination. Iomega, was able to be agile and successful only after it had a clear vision of what its goal was. Once the company mission changed to "maximize shareholder value" they lost the ability to course correct and even the desire to do so. They could optimize, but they couldn't succeed. Those paratroopers who landed in the wrong location in France didn't stop and put together a 36-slide presentation with charts and spreadsheets describing their KPIs of their job descriptions. When conditions were different than expected, they could replan and act because they understood their mission and the defined objectives. They improvised based on what they observed and learned on the ground. Too many are satisfied with just doing their jobs given the conditions handed to them instead of correcting their course to achieve their objectives and fulfill their mission. The preliminary plan in Normandy didn't really matter to the Allied paratroopers, achieving their objectives and fulfilling their mission did. I couldn't find one instance in the histories of officers holding hours-long meetings with the troops grilling them on their failure to land in the proper places. I didn't find any blame thrown around or finger pointing because their progress was slower than expected. Sure, there was frustration, but the focus was typically on how best to chart a course to their objectives based on their most current understanding of the situation.

Let's return to our airplane metaphor to investigate another aspect to agility. If you are in an airliner and there's a terrible storm in its immediate path, who do you want to make the deci-

sion about what to do? The airline CEO? A document prepared by executives that thoroughly describes the airline's operating procedures and policies? The air traffic controller? I hope your answer was, "The pilot." Why is s/he the right person for the job? Because s/he is best able to evaluate the situation and is the closest to the controls to enact any changes to the jet's course and altitude. Also, one may recognize that as a passenger on the plane, the pilot is also much more invested in a safe flight than anyone on the ground. Accountability and responsibility take on a new dimension when the worst-case scenario to incompetence or failure is infinitely worse than receiving criticism from a manager.

The airline's CEO and executives are responsible for arranging airport access, promoting and selling tickets to the passengers, and establishing destinations and timetables. They ensure that the airplane is in good working order, properly fueled, and staffed with competent pilots and flight attendants. But once the airplane pulls away from the gate, they and you want the pilots taking responsibility for a safe flight and making the decisions for that to happen. Sure, you want them to get the information they need from traffic controllers, satellites and their instruments, but the interpretation of the information and actions to take can't be reassigned to anyone that isn't at the controls. You see the symbiotic relationship: the airline management can't do their job without the pilots accepting and acting on their accountability, and the pilots can't do their job without a defined destination, a working aircraft, and the other supporting operations. The system works best when everyone fulfills their own responsibilities and respects the others in theirs.

Traditional managers speak about empowering their employees, yet they impose "prudent" controls based on "best practices" and their perceived need to manage. Their stated missions tend to be written for public relations purposes, and not to empower their employees to make course corrections. It's analogous to a pilot radioing to the ground asking the COO about which direction to fly his craft. It could be disastrous for an airplane to endure the delay waiting for such a remote and ill-prepared person to make the decisions and relay that back all while the pilots, the crew, and passengers hurl through the atmosphere at more than 600 miles per hour (about 1000 km/hr). The same is true of companies. Similar

to the D-Day invasion, the strategic choices were best made by those with visibility to the latest intelligence, knowledge of their organization's capabilities, the latest learnings and the ability to focus in on the big picture. Also, like D-Day, the decisions about where to rally, what direction to move and where to point the guns are best left to those there in the situation. At Iomega, the most productive meetings were five-minute conversations in hallways to make quick decisions about how to overcome the latest engineering or production problem. Together, the defined mission and objectives create a link that allows everyone from the top to the bottom to act in their own stewardship and stay in concert.

As many companies grow larger and are farther away from an emergency, they settle down to a "business as usual," or what many call "mature," operations where they seek for efficiencies and operations. Most rely on measures of efficiency and optimization to demonstrate their operational excellence. These concepts won't predict future success. You may be flying your airplane on course at the altitude to burn the least amount of fuel per mile and estimate an on-time arrival, but what if a storm appears on the horizon or other obstacles appear around you? You need to still be agile. The ability to withstand multiple challenges continue on to your destination is called resilience. We don't want you to be agile for a short period to withstand a difficulty or opportunity, but to remain agile so you can work through whatever happens to you along the way. The optimized you are the less agile and resilient your organization will be.

Speaking of their battles with Al Qaida in Iraq General Stanley McChrystal explained it this way:

It did not matter if they lost firefights, botched procedures, and fielded less capable fighters. It did not matter that there was no single process that they could execute anywhere near as well as we could. AQI (Al Qaida Iraq) could adjust and survive.

We were stronger, more efficient, more robust. But AQI was agile and resilient. In complex environments, resilience often spells success, while even the most brilliantly engineered fixed solutions are often insufficient or counterproductive.

Scientist Brian Walker and writer David Salt, in their book on the subject, describe resilience as "the capacity of a system to absorb disturbance and still retain its basic function and structure."[2]

Modern military organizations have technology and communications capabilities far beyond what General Eisenhower could ever have imagined. They can command and control their forces literally from the other side of the earth. For many years the Generals in charge of the wars in Afghanistan and Iraq issued orders from their offices in their Central Command offices in Florida. Similar technology allows business people to see what's happening across their international companies in real-time. That kind of power and information could make agile organizations improve their operations, but typically it creates the temptation for the opposite to happen. Managers can fool themselves that they can plan initiatives down to the detail and that their hierarchical structures should just follow the plan they issue. Never let technology and efficiency tempt you to retract the ability for your people to lead within their own spheres and make quick course corrections based upon what they see from where they are. Never allow policies to strangle initiative, innovation, and success.

Speed and interdependence had rendered our environment in Iraq incompatible with the vertical and horizontal stratification that had maintained military order for centuries. The distance that carefully regulated information had to travel, and the wickets through which decisions had to pass, made even the most efficient manifestation of our system unacceptably slow. The chains of command that once guaranteed reliability now constrained our pace; the departmental dividers and security clearances that had kept our data safe now inhibited the exchanges we needed to fight an agile enemy; the competitive internal culture that used to keep us vigilant now made us dysfunctional; the rules and limitations that once prevented accidents now prevented creativity.[3]

While Eisenhower may have wanted better communication, I'm sure he nevertheless would have agreed with Randy Salley from Walmart who described how to make agile operations work best: "Replace command and control with speed, innovation and passion."[4] Similarly, Chris Cale encourages agile leaders to: "Shift from command and control to empowerment."[5] If we could give some technology to the Allies in D-day where would you place it? I wouldn't give it to the Generals to know exactly where everyone was and the ability to tell them where to go, I'd give it to the troops in the field to help them know where they were and com-

municated with those immediately around themselves. As we saw, they overcame their challenges because the trust from their leaders and capability to improvise when needed. We should never take that away, but find ways to enhance it in organizations.

I boasted above that I could prove business Agility is the best philosophy for an organization. Did I do it? You can see that it's applicable to a wide range of endeavors. You can also see that in our previous case studies that training and requiring the rank and file of an organization to convert to Agile practices can take time, be difficult and sometimes costly. Coincidentally, it required Iomega and the Allies about two years to transform once the commitment was made. As they say, your results may vary. We'll talk about this in detail in a subsequent chapter.

It's good for the enterprise, but what's the value of Agile to the employees? I once heard a veteran say "everything above sergeant is just talk." I will now lay out a quick pitch for the benefits of Agile to the enlisted men and women of a company.

I have done extensive international travel for most of my career. My favorite cities for business are New York, Tokyo, Hong Kong, Singapore, and London. The primary reason is that once there, I can visit many customers, partners, and other companies quickly. Whereas, in California though the weather is great, traffic and distances often mean I'm quite limited in the number of things I can do in a short period of time. In Tokyo, I can go from one important company to another by jumping on a train for short jaunts. The same is true for the other cities on my short list. The density of important companies allows me to do everything via walking, taxi, bus, or local train/subway. Selecting the mode of transportation typically comes down to a determination of whether public transportation can take me to where I need to go. If not, taxis will need to be employed to some extent.

The primary difference between a taxi and a bus is simple. A taxi can go anywhere, and a bus (or train) has a set route it must follow while maintaining an established timetable. London and Tokyo are the geographically largest cities in the world. Tokyo's train system is better, so London's taxis bear a relatively higher burden. London officials understand this and have instituted a stringent program to ensure that their taxi system can serve the passengers appropriately. Trainee drivers may drive provision-

ally for several years before taking a certification test, called the Knowledge of London Examination System. They must pass this difficult examination to become a registered taxi driver. It requires up to four years for drivers to learn the 25,000 streets and the specific locations of thousands of landmarks and important places. A bus or train driver has an important job, but it doesn't include making any alterations to their defined routes. Every time a passenger enters a taxi, the driver must start planning and executing a new trip and make course corrections along the way based upon traffic situations.

Researchers at the University College London conducted a series of studies investigating the effects of being a taxi driver on their brains. Initial studies using magnetic resonance imaging (MRI) showed a taxi driver had a larger hippocampus than non-drivers. Learning how to navigate within a complex environment actually grew additional brain grey matter. In studies like this, moving from identifying correlation to deducing causation can be difficult. In a 2006 publication, the research compared taxi drivers to bus drivers whose work environments were roughly the same. They summarized their findings:

> We examined the contribution of these factors by comparing London taxi drivers with London bus drivers, who were matched for driving experience and levels of stress, but differed in that they follow a constrained set of routes. We found that compared with bus drivers, taxi drivers had greater gray matter volume in mid-posterior hippocampi…[6]

Learning the spatial information and acting on it actually modified their brains' structures. Additional studies tried to identify more cause-effect conclusions. In 2011, the same researchers published another study. In it, they found new details from long term observations. The structural change to the brain occurred only to those taxi drivers who passed their exam and continued on as registered taxi drivers. They said, "We conclude that specific, enduring, structural brain changes in adult humans can be induced by biologically relevant behaviors engaging higher cognitive functions."[7] Those who passed the test studied more and had a higher commitment level to applying their knowledge. That commitment to obtaining and applying their knowledge to make

better decisions caused their brain improvements, versus those trainee drivers who spent the same amount of time in the cars without the same level of diligence and application.

Licensing your employees to be taxi drivers (or pilots depending on which analogy you prefer) over a long-term actually can improve their brains, attitudes, and capabilities. Logically you can see how an Agile organization naturally creates more confident, capable, and creative employees. It's my experience that employees who can thrive in an agile environment are happier than those in traditional environments where they are treated more like bus drivers: given tasks, timetables and defined processes from which they may not deviate. From a distance, their jobs may seem almost the same, just as taxi drivers' and bus drivers' jobs are similar. However the underlying differences are significant. We should acknowledge that the research, my observations and common logic indicate that those who prefer life as a bus driver, literally or metaphorically, will not thrive or be happy in a job requiring Agile behavior and responsibilities. We'll address this in subequent chapter.

In a managerial world preoccupied with scientific processes, analysis, and comparisons, the bus driver world allows for easy quantitative evaluations of employees. However, an Agile approach is required in a quickly changing world with new requirements for survival and ever-diminishing windows of opportunities for breakout performances. It's good for the organization and for the workers . . . and their customers.

If you want your company to go places to which it hasn't gone before, then you need your employees to be taxi drivers. If you want to see new horizons, then you need your employees to be pilots. Let go of the months of documentation and meetings. Define your destination and take off, refining your direction as you learn from doing. Be flexible as you stay steadfast in your mission. Be Agile.

The following portions of the book will tell you how to get ready for this transformation, the principles to employ, and the supporting methodologies you can use to transform successfully and continue on as you course-correct to arrive at your desired destinations.

End Notes

1) Dieter F. Uchtdorf A Matter of a Few Degrees, Liahona May 2008. See also: https://aviation-safety.net/database/record.php?id=19791128-0
2) McChrystal, General Stanley. *Team of Teams: New Rules of Engagement for a Complex World* (Penguin Publishing Group) page 76. See also the primary topics in the book, *Resilience Thinking: Sustaining Ecosystems and People in a Changing World*, by Brian Walker and David Salt
3) Ibid, page 83
4) Randy Salley of Walmart, Presentation at the Agile Executive Forum, Herdon, VA, August, 3, 2015.
5) Chis Cale of Cox Target Media, Agile Exeutive Forum
6) Eleanor A. Maguire et al., Hippocampus 16:1091-1101, 2006
7) Katherine Woolett and Eleanor A. Maguire, Current Biology Volume 21, Issue 24 20 December 2011

Appendix

What's Coming

The proceeding is the first section of the completed book. There are three additional sections and a reference portion that will complete the effort. In addition, All the of the chapters will begin with a thought-provoking quotation from a short list of sources, and contain photographs and charts to help explain the concepts.

The follow is a Table of Contents of What will come: