SMART Goals, Dumb Results:

Observances of Mismanagement

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Table of Contents

Intro 1

SMART Goals in Their Native Habitat – Sell 48 Widgets for $8 Each Yearly 9

Put Out 100 Fires by Year End 12

Cross Atlantic in 4 Days, 10 Hours, and 50 Minutes 15

Bomb Germany Out of Existence by Mid-1943 17

Paint the Porch Green 23

Issue One Hundred Loans Per Quarter by End of 2008 25

Overtake Ukraine by the End of March 27

Zero Safety Incidents in the Coming Year 34

Complete Cementing by Mid-March 40

Sell Six Bird Cages Each Day 44

Complete Natural Gas Facility in 1975,1978, 2003, 2008, 2014, 2022 45

Complete Hotel by 2003 51

Start Test on December 17 53

Complete One Dam by 1926 58

Revise the Recipe for the World's Most Iconic Soft Drink .. 62

All Renewable Power by 2040 64

Limit Spending at Grocery Store to $150 per Week 78

Deliver One Message Before Battle 80

Complete Engineering by End of Year 84

Advance Troops One Mile by Sundown 88
Fire 20% of your employees each year 91
Select The Boss of the Body by the End of the Week 95
All Cars Electric by 2035 100
95% Utilization Rate 111
84 Hours Per Week 113
Zero Change Orders on Four-Year Project 122
Provide the Emperor with New Clothes 125
10,000 Keystrokes Per Day 128
Produce Pilots in a Reduced Amount of Time 131
Shut One Window Before Class 135
Commission Solar CO2 to Methane Converter in 18 Months 137
All Cub Scouts Den Members Advance Rank by End of Year 142
Sell 200,000 Ugly Cars with a Strange Name in 1958 144
Hold Design Team to 40 Hours Per Week 147
Launch Space Shuttle at 9:38 on January 28, 1986 149
Restart Plant on March 23, 2005 151
End Gas Compressor Station Emissions by 2030 153
Deliver One Oven Microwave Combo by April 14 157
Make Your Bed First Thing Every Morning 162
Debunk Oblers' Paradox by the End of Chapter 166
SMARTER Goals 171

Reference Notes by Chapter..173

Intro

Paraphrasing from Ray Dalio's book *Principles* - Thoughtful resolution of disagreements can lead to progress. However, to achieve that progress, Ray learned he had to first stop firing anyone who disagreed with him. While you may disagree with my insinuation that SMART goals are associated with dumb results and want to respond in a way that is far from thoughtful, you might be surprised how consideration of some goals that have gone wrong or are in the process of going amiss might lead to SMARTER management practices in the future.

I realize you may think me a bit of a contrarian for taking a swipe at a gold standard of everyone from mega-corporation CEOs to cub scout den mothers. Lord knows what people will think when I offer thoughtful consideration that being anti-green power and pro-coal plants is good for the environment.

I pause here while those of you who had the top of your head blow off when I said pro-coal plants put the top of your head back on. I'll try to be more careful until we get to that chapter, but I promise what I present related to the environment is not as bad as you think. It is more of a moderation in all things sort of concept. And if you are looking to keep track of themes that will pop up often in our better goal-setting discussion, moderation is right at the top of the list.

And speaking of moderation, how about this gem: If all your turns are only left or right, you will just go in circles. To get anywhere takes moderation.

(I would like to think I was the first to say that, but I could have heard it somewhere. I am not looking it up because then I would know who said it first or at least who is credited with saying it first. This was the case recently when my sister quoted her friend Augie as the originator of, "I would agree with you, but then we would both be wrong." I then met the same words when the internet lured me to click on famous Steve Martin quotes. With curiosity then peaked, I dug further to find the actual credited originator, Russell Lynes, the long-time managing editor of Harper's magazine. His book "Snobs: The Classic Guidebook to Your Friends, Your Enemies, Your Colleagues, and Yourself," is quite entertaining.

Further coincidence, when attempting to refresh my memory of the originator of Augie's quote, the top result, rather than being what I was looking for, was the Bible verse Matthew 18:19: "If two people agree on earth about anything they ask, God will grant their request." Sounds a little like disagreements thoughtfully resolved… Freaky huh? But I have waffled from my course long enough.)

Getting back to my gold standard / sacred cow attack, those from cub scout den mothers to employees of about anywhere have been asked to drink the SMART goal Kool-

Aid. In concept, SMART goals provide a sharper focus for vague ideals, and they work for Specific (Specific is a clue for later) applications. With a general theme of moderation in all things, what follows is where SMART goals come closest to working, where they have or have had issues, and how we can create SMARTER goals to fit moving targets.

Now, to the meat of the matter, SMART is an acronym that stands for, um, well… I guess that is where SMART begins the transition to dumb.

Some SMART goal presentations make you wonder if someone got a fifteen-minute meeting notice only to realize they were the one presenting on SMART goals.

"S" is for, uh, Something

"M" stands for Motherhood

"A" is All about me

"R" is for Redneck, and "T" is for T-bird

No, wait a minute, those last two are lyrics from a Jerry Jeff Walker song. (You are welcome to pause for a YouTube play to enjoy the strains of "Up Against the Wall Redneck Mother" while reading the rest of the introduction.)

And yes, my little example was a bit harsh, but every letter in SMART has definitions that vary from one goal-setting presentation to another. You would suspect the

variations follow different agendas, but from what I have seen, it is random. To familiarize readers with the concept, here are some options for each letter of the SMART acronym with choices that I hope you consider well thought out rather than random.

S in most cases, stands for Specific. I absolutely agree specific is a great start to a good goal. I think there is a special place in heaven for the poor souls whose managers think "S" should stand for Stretch. Is there a better path to failure than performance measured against goals that are intentionally set beyond expectations? Without further debate, let us move forward with "S" for specific.

M could be Mutual, Motivated, or Meaningful. While the last of these, Meaningful, brings satisfaction to a job, it is a bit hard to quantify. For the judging of quantities, Measurable fits well into the "M" slot in SMART. That said, one of the great tragedies of modern management is people with heads buried in spreadsheets, measuring, and measuring and measuring and measuring from dusk till dawn rather than doing the other great "M" word, managing. One of the great ironies is that Deming (for the uninitiated, W. Edwards Deming effective management god) is credited with saying, "If you can't measure it, you can't manage it." What he said was, "It isn't necessarily true to say, 'if you can't measure it, you can't manage it.'" Another "M" word is Metric, which, other than being a way non-Americans measure things, is a quantifiable measure that is used to track

and assess status. Related to metrics are Key Performance Indicators (KPIs). All KPIs are Metrics, but not all Metrics are KPIs. A challenge for SMART goals is including Measurements that are performance indicators rather than simply measurable values.

A can be Actionable, Action Oriented, Assignable, Accountable, or Accepted. From my "M" discussion, a logical choice is Applicable to the person for whom the goal is being set, but if we do not know the person for whom we are setting goals, why are we even bothering? My preference for "A" are the synonyms Achievable and Attainable. With Achievable, the more American sounding of the two, I pick that. Looking at the other options, I ask what is not assignable. However, are they trying to say within someone's assigned area of control? Is actionable a hifalutin way to say assignable? Accountable is sort of, kind of, more measuring, which, of course, might need to be said with "A" if "M" was something other than Measurable. When discussing different choices for other letters in SMART, other "A" options might work if, spoiler alert, Realistic in the "R" slot covers for Achievable. (As a side note, I have seen versions of SMART where Achievable and Realistic were side by side. I propose if a program is SMART, it should at least avoid redundancy in its acronym.)

R definitions can start by dropping Realistic or Reasonable. It isn't that I have an issue with being realistic or reasonable, it is just there is no need to say the same thing

as we have just stated with our "A" word. Relevant is a very popular filler for this spot. It is certainly better than Results-focused or the feel-good clan's Rewarding. While a minority selection, I like the slightly clunky term Resource-Driven. I think we can agree there is a certain dumbness to bankrupting a company to achieve a silly little goal. Other presentations pick the top two, "Relevant or Resource-Driven," but I am going to put my foot down on that suggestion. We ended the debate on "S" with Specific and if you are being Specific, you cannot be wishy-washy on the other letters. If we are making a goal for a Specific individual or group, that Specific goal better be relevant to that individual or group. So, get your head out of your spreadsheet and make sure you see the human being you are setting a goal for, and do not give the undertaker's "number of dead bodies" goal to a doctor. After that brief interlude, for "R," I pick the "not bankrupt the company" option of Resource-Driven.

T stands for Time, though I did see one case where the spreadsheet addicts reared their heads again with Trackable. Stretch, Meaningful, Accountable, Rewarding, Trackable goals are just what the world needs to squash productivity and create job frustration. (That was sarcasm, folks. I cannot wait to see that acronym definition as the answer in a last-minute presentation creator's slide.) Returning to the task of the best definition for the SMART acronym, the answer for "T" is time. That said, with "T" time, a notable way SMART

goals are dumb is when you really do not want people to rush, like when a doctor is working on your heart.

So, for the rest of this work, SMART stands for:

S – Specific

M – Measurable

A – Achievable

R – Resource-Driven

T – Time-Based

What SMART goals are is a replacement for generic statements like, “My goal is for me to be a better me.” What SMART goals are not is a universal salve for all situations. With everybody and their brother/sister/sibling using SMART goals, there must be something there. The question is whether the SMART criteria apply to a given task and/or if the SMART criteria are incentivizing other than desired behavior.

What follows are traditional SMART goals interspersed with classic tails reframed as SMART goals, infamous historical events traced to SMART goals, and commentary on large-scale goals suffering from SMART tunnel vision. (Yeah, that’s where coal plants come in. Please gently glue the top of your head back on once again.)

As a rap up, suggestions make it clearer how to use SMART goals and, when you do, how to make them SMARTER. If that is all you want to know, you are welcome to skip to the end, but what fun would that be?

Important Note:

The reduction of historical events to SMART goals is in no way meant to trivialize devastating tragedies. Examples show how far a plan gone wrong, can go wrong.

Less Important Note:

Included firsthand experiences might be viewed by others as simply venting on my part. In that regard, for specific sections, I would find it hard to disagree. I leave those sections in place, hoping they might offer comfort to others who have suffered through supervisors from the Dilbert school of management. You have not been alone.

SMART Goals in Their Native Habitat – Sell 48 Widgets for $8 Each Yearly

Specific:	Sell widgets
Measurable:	48 widgets
Achievable:	We will assume, yes
Resource-Driven:	$8 per widget
Time-Based:	Per Year

The SMART acronym first appeared in the November 1981 issue of Management Review. "There's a S.M.A.R.T. way to write management goals and objectives." was the title, and it was written by George Doran, Arthur Miller, and James Cunningham. Fun facts from that original article:

1. Goals and objectives are two different things.

2. Goals are continuous and long-term. Examples were “Conduct all corporate activities with honesty, integrity and fairness” along with “take an active role in community activities.” Ironically, both are examples of vague statements that modern SMART goal presentations say to avoid.

3. Objectives give quantitative support to management’s beliefs. Before the first mention of the SMART acronym,

a proper objective was presented as "Develop and implement by December 31, 198_ an inventory system that will reduce inventory costs by $1 million, with a cost not to exceed two hundred work hours and $15,000 out-of-pocket initial expenditures.

4. Doran's original acronym definition was Specific, Measurable, Assignable, Realistic, and Time-related.

Three out of five ain't bad. While it is a less-than-optimal path to success to disagree with the inventor of something, about that something, I will double down. As previously mentioned, I disagree with the definition of "A" as selected by the guy who invented the SMART acronym partially because it requires "R" to be realistic, while his first SMART objective example was clearly Resource-Driven.

Setting targets for salespeople is why SMART goals were born, and I have created a classic case to illustrate SMART goal setting in its simplest iteration. Specifically saying what the salesperson will sell is a wonderful concept, but difficult to implement in practice. Using car sales as an example, it is easier to sell cheaper cars. Giving the top bonus to the person who sells the most cars may put money in the hands of other than the salesperson who earns the most profit. That is especially the case when a salesperson gives huge discounts to sell cars. Thus, my little Resource-Driven suggestion rears its head, and the widget price is seen in our goal.

A manager can hand this goal to a salesperson on January 1 (or March 1, as discussed later) and spend the next three months gleefully staring at the spreadsheet that ticks upward with each sale by his staff. On April 1, the manager rewards those achieving the goal with a bonus, encourages those who gave the good old college try, and fires the worst performing 20%. Okay, that is an exaggeration. They only fire the bottom 20% at the end of each year, which is something else we will talk about later.

Put Out 100 Fires by Year End

Specific:	100 Fires
Measurable:	Yes
Achievable:	How do you guarantee 100 fires?
Resource-Driven:	Need crew, equipment and 100 fires
Time-Based:	By Year End

After saying sales is where SMART goals work best, firefighters are an example of where SMART goals can incentivize undesired action. Beyond the unthinkable possibility that arson might be a means of ensuring the number of fires, we look at other goals assigned to those in standby positions.

Firefighters could have a 10 AM Tuesday fire truck inspection goal. What happens if a fire call comes in at 9:50 on Tuesday morning. Achieving our goals says we wait till after inspection to answer the fire call. Saving lives and protecting property, the reason the firehouse, fire trucks, and firefighters exist, require that the firefighters jump on the truck the minute the alarm sounds.

Firefighters certainly have training goals, but is that controlled by individuals or by their supervisors? If everyone takes training at the same time, there is no one to fight fires.

Is the choice of courses up to the individual, or are there things you simply must know about equipment and procedures to be a firefighter? Training may be one of those cases where we want the "R" in SMART to be "Relevant" rather than employees selecting training based solely on the quality of nearby golf courses. At the same time, if there is a choice between locations for mandatory training, it boosts morale to allow the selection of a location near a golf course. Rather than communicating by yearly written goals and spreadsheets, supervisors and employees could talk to each other to decide what works best for both sides. (Notice how supervisors getting to know their employees keeps appearing. That might have something to do with an immediate supervisor who officed one hundred feet away from me and talked to me only twice a year, once to set my goals and once to review them. My fault, you say! I could have sought him out, you say! I could have, except after a reduction of engineering staff from nine to just me, I was busy doing the work of multiple people while a technician, Mike, and I kept the site running. Sorry, I digress, sore subject.)

Back to talking strictly about firefighters, there are jobs where expectations are self-evident without the need for goals. A firefighter shows up to work every day on time. Do we need a goal for that? While waiting at the firehouse for an alarm, the firefighter washes the truck, helps clean the bunkhouse, and fits in mandatory training. Easily, those actions could be goals. Certainly, achieving a ten on

firehouse inspections sounds like a SMART goal for the house captain passed on as a SMART goal for everyone in the house.

Sadly, inspections are a goal by which headquarters recognizes captains selected for promotion. Captains of shiny new stations in the nice part of town that have few fires, ace inspections. Captains in shabby little stations where there are frequent fires score poorly on inspections. Station assignments may be a result of inspection scores when the captains were just part of a crew. Specific goals, without situational considerations, can lead to unrecoverable downward vortexes with the gritty people you most want to fight a fire, being the last in the reward chain.

Cross Atlantic in 4 Days, 10 Hours, and 50 Minutes

Specific:	Cross Atlantic
Measurable:	Yes (From Queenstown to Ambrose Light)
Achievable:	Likely not
Resource-Driven:	Yes
Time-Based:	Less than 4 Days, 10 Hours and 51 Minutes

The Blue Riband was a blue pendant flown with prestige by the passenger vessel in regular service that had crossed the Atlantic Ocean the fastest. The highest average speed was the measured criteria rather than time because ships took different routes. In a bit of gamesmanship, lighthouses passed while the ship was at full speed were used rather than including what could be a slow, lengthy process of arrival at the dock. In 1909, the Cunard liner Mauretania set a mark of 4 days, 10 hours, and 51 minutes with an average speed of 26.06 knots.

In the quest for transatlantic passengers, there was the ongoing debate of which was the greater draw, speed, or luxury. Cunard's rival, the White Star line, launched a larger, more luxurious class of ships for Atlantic service. With a

specified top speed of only 23 knots, they were not expected to threaten the Mauretania's hold on the Blue Riband. But, when the second of the class was ready for her first voyage, she might have more speed than her slightly older sibling. Then, not only would she be the most luxurious vessel on the sea, but she would also be the fastest.

Leaving Queenstown, Ireland, with the boiler crew stoking for all they were worth, she headed for America with all caution thrown to the wind. With less than two-thirds of her voyage complete, the Titanic struck an iceberg and sank with the loss of 1,517 lives. Among those lost were the ship's captain and the ship's designer, who are the only ones who can say for sure if there might have been an unrealistic belief that the Blue Riband was within reach.

Bomb Germany Out of Existence by Mid-1943

Specific:	Out of Existence
Measurable:	Out of Existence
Achievable:	Debate continues
Resource-Driven:	We only have so many Norden bomb sights
Time-Based:	Mid 1943

The common ground between goals and bombs is that good ones hit their targets. In terms of bombing quantity, the golden age was World War II, but that was not without procedural controversies. American preferred daylight precision daylight bombing. British, having their backsides handed to them in a basket during daylight raids, concluded that night raids were better. They might not hit anything, but planes came home, and they were keeping Germans awake at night.

American generals, who did not have to fly planes blown out of the sky, thought precision bombing was the better answer. This was in part out of arrogance but also because United States bombers included a wondrous instrument called the Norden bombsight with which a skilled bombardier could “drop a bomb into a pickle barrel from

20,000 feet." If that claim had indeed been true, the added bomber flight crew casualties resulting from daylight bombing would have accomplished more than just the considerable drain on German resources needed to shoot down daylight bombers. However, the first challenge to precision was the value of the Norden bombsight both in cost to buy and worth to the enemy if one fell into their hands. This meant the Nordens were installed only in select planes that would lead raids. The rest of the flight, scattered over square miles of air space, dropped bombs at the same time as the leader. Rather than hitting pickle barrels, precision was within eight blocks of the target. That is an area of two square miles or 1260 acres.

That was the best dumb bombs could do versus modern smart (small letters) weapons that can be routinely directed through a three-by-three-foot window. We want goals to hit the target every time, like modern weapons, but in their present state, SMART goals have more in common with the dumb bombs of World War II. Precision is certainly the plan, but do we have the resources to target each goal? Upon release, the best calculations for wind and other factors are in our aim, but then, what happens, happens. In theory, the person assigned the goal will be the rudders and elevators that guide towards the bullseye. However, if conditions are beyond adjustable limits, we have a bomb headed for a city's hospital district and no way to stop it. In terms of employee goals, that bomb in the hospital district is a demoralized

employee, costly measures to achieve a goal that no longer provides value or incentivizes other than desired actions.

The paradox of a goal that is specific about scope and time is how do we support flexibility related to scope and time? This is where managers must get their heads out of their spreadsheets, listen to the rumble of storm clouds, and stick a wet finger in the air to judge the wind. In the military, this involved the realization that a goal had been Overtaken by Events (OBE).

In the clearest of examples, if there was a plan for a thousand planes to drop bombs on Berlin on May 15, that plan would be OBE if the war ended on May 8. Further equating modern management with World War II, certainly, the corporate equivalent of the thousand plane raid would be stopped, and that missed goal for the third highest ranking officer of the company dismissed without penalty to that officer. Where employees have a close working relationship with their supervisors, OBE is routine. However, for goals of people whose supervisors have their noses stuck in spreadsheets, unless there is a trickle-down mechanism that will adjust the spreadsheets, unfortunate things happen like the single squadron raid in which an American fighter pilot died in combat…days after Japan surrendered. Beyond the too-bad, so-sad cases where employee bonuses get trashed, there are huge expenditures or tragedies that occur in the name of fruitless attempts to achieve SMART goals gone dumb.

(A side note; when the United States brought the air war to Japan at the end of World War II, precision bombing was ineffective because the Japanese had moved much of production to mom-and-pop operations spread all over Japan. While this clever strategy emaciated the United States' precision bombing with their shiny new B-29s, it led to the American realization that mom-and-pop homes were made of wood and paper that burned well. With the smug British on the other side of the globe, the United States transitioned to lower-risk nighttime firebombing.

Directly or indirectly, as the debate continues, the SMART goal to "Increase munitions production for 1944 by distributing manufacturing sites" led to an estimated 900,000 people killed by the United States' response to the Japanese manufacturing strategy. Detractors call the bombings genocide, but these operations against a declared enemy of war, either by destroying the mom-and-pop operations or by decimating the Japanese workforce, contributed to a large decline in industrial production. Talk about a SMART goal gone bad.

The sad continuation of the story is that with cities burning across their nation, Japanese leaders could have surrendered at any time. The outcome of the war was clear months before the actual surrender in August of 1945. However, after trashed bonuses following the mom-and-pop debacle, the arrogant leaders, who hasn't met some of those, came up with a SMART goal to "Inflict 500,000 casualties

on American forces during the anticipated D-day like assault on Japan, in 1945." You gotta love it! All the SMART criteria. Specific, Measurable, Achievable (entirely so, based on American losses at Iwo Jima and Okinawa), Resource-Driven (minor detail, Japanese military and civilian deaths were more than three times American casualties during the aforementioned battles), and Timely (at least they got the1945 part right). Others can do the math for the number of present-day descendants of those hundreds of thousands of soldiers and 1.5 million Japanese (with a 200,000-person reduction to follow) who owe their existence to the United States, making the Japanese plan OBE.

Certainly, with the 500,000 and 1.5 million being strictly theoretical, it is easier to focus on the very real number of two destroyed cities and 200,000 people (estimated) lost due to the implementation of a couple horrible weapons, the likes of which we pray will never be used again in anger. And in our prayers, we plead that consideration of the devastation in those two Japanese cities will give pause to world leaders, terrorists, and those considering any form of random violence. And in that pause, it should be considered that looking to bring pain to others came back three or more-fold not just to the perpetrators but to innocent loved ones. And with that consideration we continue our prayer with the hope that thoughtful pauses can put misguided plans aside. We end the prayer with the hope that all may live their lives with

the goal of doing unto others as we would have them do unto us. (Sorry, no measurable values or time base on that goal.)

Paint the Porch Green

Specific:	Paint the Porch Green
Measurable:	Painted Porch
Achievable:	Yes
Resource-Driven:	Bucket of Paint
Time-Based:	Before the wife gets back

And now lightening up the mood a bit, the story goes that a man was traveling in the countryside and saw a large house. He knocked on the door and offered to work for money. The owner responded that this was perfect timing because the porch needed painting while the owner would rather be watching a football game on TV. “Just go out back. The paint and brush are there. Paint the porch, and I will pay you $100.”

The traveler went out back but quickly returned, asking, “I see the paint, the brush, and the porch, but I just wanted to check if you really want me to paint the porch.”

“Yes,” said the owner.

“But…,” said the traveler.

“No, buts, the game is just getting good. Paint the porch like I asked,” said the irritated owner.

The traveler shrugged and headed out back. Shortly after, he returned to tell the owner, “I finished the porch. Would you like me to start on the BMW?”

At this point, we picture the frustrated owner going with the traveler to the back of the house to shout and point, “Not the por-shuh, the porch!”

To which the traveler answers, “Oh, you wanted me to paint the stoop.”

Lesson learned; goals are worthless without clear instructions.

Issue One Hundred Loans Per Quarter by End of 2008

Specific:	100 Loans
Measurable:	Yes
Achievable:	Yes, if you are not too particular about whom you give loans
Resource-Driven:	Hey, there is always money
Time-Based:	Evaluated per quarter

Could there be a better application for SMART goals than a lending institution? We know the number of loans issued by the average lending officer last year. The measure for good is that number. If you achieve more than that number, you are great. Less than that number means you need improvement. How could there be a problem with using last year's numbers as goals unless the entire economy turns upside down or possibly, where real estate is involved, the price of houses changes dramatically?

Counting loans and number per quarter is certainly measurable, but then there is the neat trick of using the "R" in SMART to consider resources. Does your firm have the resources to provide the money to lend, or will funding need mortgage-based commodities to boost funding? Will

officers hungry to issue loans verify that those seeking loans have the resources to repay the loans?

Thus, it was that goals without consideration of resources led to a veritable economic collapse, resulting in the average 401 (k) fund value in the United States falling by 20%.

Overtake Ukraine by the End of March

Specific:	Did you mean all of Ukraine?
Measurable:	Yes
Achievable:	You would think so
Resource-Driven:	Resources of the largest country in the world
Time-Based:	Did you mean March of 2022?

As a continuation of the Russo-Ukrainian War that began in 2014 after the Russian annexation of Crimea, Russia launched a full-scale invasion of Ukraine in February of 2022. It was supposed to be quick and easy, like Germany rolling over Poland at the beginning of WWII. What Russia overlooked was the people they were attacking were not pre-WWII Poles but the descendants of the very same people who put an end to Germany's rolling over people back in WWII.

Also, things have changed since the good old days of warfare. As proven in Vietnam, Afghanistan (Against Russia), Iraq, and Afghanistan (Against the United States), clever guerillas can make life miserable for the strongest countries on earth for a long, long time.

Early in the conflict, I had to ask who was dumber; the Russian president who subjected his country to the ire of the world to take over Chernobyl or the American president who expressed that ire by raising gas prices in California? In President Biden's defense, I could have alternately used as examples the leaders of all the European countries whose ire was expressed by cutting off their own natural gas supply. The biggest irony is that people forget that the Soviet Union previously got by during over forty years of Cold War sanctions. What? No, Levi's is going to kill them now?

The bigger question is why? Russia is big enough. Rather than a land grab, the Russians claim the point is ending the evil political ideology of the Ukrainians as if communism is better than anything else.

(Fun background to this, with some paraphrasing as in my reference to *Principles*. In the early days of the Soviet Union, government leaders who were smarter than everyone else randomly chose who would work where. Farmers from the Ukrainian breadbasket moved to tenement housing in cities where those of their natural dissident nature could be watched and where they would become lousy steelworkers. Steel workers, being true Russians, moved from the city squaller to now enjoy the Ukrainian plantation life. Of course, most farms are far less than plantations, and farming is hard work, especially for ignorant steelworkers who turned out to be lousy farmers. Further side note, Communist China did the same thing years later to nearly starve their

country out of existence. In China, the discovery was quicker. Someone may have read Soviet history, with recovery enabled by farmers who hid local rice seeds that worked where government hybrids failed. In Russia, however, there was no recovery via the farmers because the Ukrainian's faults as steel workers were further evidence of dissidence, and they were gathered for execution or banishment to Siberia, from which none returned. With their country starving, what could the Soviets do?

As it turns out, Germany was facing an overpopulation crisis because they had so many fantastic farmers. The Soviets offered Germans ready-to-occupy farms complete with implements, large tracks of land, barns, and houses that were recently vacated by the steelworkers returning to steelmaking.

Farming output grew rapidly. Soviets quit starving. The government was pleased with the production of German Ukrainians, but still, they were Germans, and we all know how Germans can be. I went to the Passion Play in Oberammergau, Germany (fantastic and everyone should do that at least once in their life). After the presentation spoken in German, our priest offered the observation, "I have never heard such an angry sounding Jesus."

Anyway, once their bellies were full and some Russians learned how to farm, they started treating German Ukrainians, people who were now second or third-

generation Ukrainians, as second-class citizens. After the German army stormed through Ukraine, the German Ukrainians became more than first-class citizens, with the local Russians dropping to second-class or death. The next time the German Ukrainian farmers saw the German tanks, the panzers were in full retreat with Russian T-34s hot on their tails. Faced with second-class citizenry or death, German Ukrainians accepted offers of farms complete with implements, large tracks of land, barns, and houses in Germany and Poland from which Jewish farmers had mysteriously disappeared.

After German Ukrainian civilians joined the forced exodus of Nazi forces, those of German heritage who remained were henceforth stuck with the Nazi moniker even though their ties to Germany had ended years before there was even such a thing as a Nazi.

On that subject, it is reprehensible to place the Nazi moniker on anyone just because they are German. I have not watched a Susan Sarandon movie since, well, actually, Rocky Horror Picture Show, or wait, she was typecast as a witch in Enchanted. I could not let an unfortunate blot deprive me of the sweetness and beauty that is Amy Adams. Oh, but back to what got my panties in a wad about Susan Sarandon; she referred to Pope Benedict as “the Nazi Pope they have now.”

I mean, really! People on my list of the nicest I have ever known were Germans. One of my first mentors at a company half-owned by Germans was a former infantryman in the German army during WWII. One day at lunch, he told me of how, at the end of the war, he was in Italy, and his party member commanders just said, “War’s over. Go on home,” before those same commanders scurried away to find civilian clothing. There he was, a skinny 18-year-old kid in his army uniform having to make his way on foot to the German border while avoiding stoning by the locals.

That man gave me a wonderful recipe for German apple cake that I still have. He brought homemade cake as a farewell gesture on my last day before my transfer from Milwaukee to New Orleans. After my swoon upon tasting that slice of heaven, he asked if I wanted the recipe. Talking in German, on engineering paper he produced the handwritten recipe that was for the first time translated from German to English.

Handing me the paper, he asked when I was leaving. I told him my boss said I was on the Milwaukee plant clock till the end of the day. Looking out the window and seeing a blizzard brewing, that former German infantryman told me my day was over now. He wished me a safe trip, and I was gone at 10:00 rather than 4:30.

After a harrowing two-day drive in a blizzard while towing a U-Haul with a beat-up old Fairlane, I arrived bright

and early at the New Orleans office to be greeted by a fresh-looking fellow trainee whose boss had authorized a full week off for his move from Atlanta. My penny-pinching bosses, in a company with no official rules on the subject, had conveniently avoided the impact on their budget and loss of employee productivity.

Beyond labeling Germans or ethnic Germans with the nazi moniker, I would suggest restraining from calling anyone a nazi. As embodied during the Third Reich, nazis were really, really, really, (I could string out "reallys" past the end of the page.) bad people. If there was ever a wish that anyone would permanently disappear from the face of the earth, it would be the Third Reich Nazis. (Aligning with moderation in all things, I understand that there were people within war time Germany who were technically party members but performed no untoward acts. With that clarification, I think we have a clear picture in our minds and know of multiple examples of the really, really, really, bad Third Reich people that I am talking about.)

Lately, however, nazi is the first thing out of people's mouths to describe anyone voicing disagreement. The left calls the right nazis for suggesting that following laws is a good thing. Fair disclosure, it is only certain laws with which the left has issues. The right calls the left nazis for cancel culture of the right. Jerry Seinfeld calls someone a nazi for having strict rules about ordering soup.

Does Jerry think the soup nazi is a really, really, really, bad person who should disappear from the face of the earth and have his Tesla burned? No. Jerry likes the guy's soup and wants the guy to keep making soup. He just wants the ordering of soup to be less procedural. So, call the guy rigid. Nazi really isn't funny anymore.

Thus, I have deeply digressed into Ukrainian history and the memories of a fine former German infantryman to finally get to the point. The Russian premier is calling Ukrainians Nazis to justify his country's encroachment on their land. I just thought people might want to know the company they are keeping when they call someone a nazi to justify their own actions.

Ideological excuses aside, the present-day Ukrainian fiasco is about ego. Russia wants to prove they are the most powerful country on earth. Great! Being the most powerful country on earth and $3.50 will get you a Latte at Starbucks. (For youngsters out there, this is an inflation adjustment of "and a nickel will get a cup of coffee." Adjustment value may not apply to where you live.)

On the other hand, being the most preferred trading partner on earth is priceless.

I hope China realizes that before they act against Taiwan. I would hate for our president to express his ire by refusing to import Chinese semiconductor chips.

Zero Safety Incidents in the Coming Year

Specific:	Zero
Measurable:	Anything more than zero
Achievable:	Yes
Resource-Driven:	Can come at the expense of production
Time-Based:	Per Year (Typically stated without a time base, but I wanted to make this SMART)

Safety is important. Everyone should go home from work the way they came. From crane safety to arc flash Personal Protective Equipment (PPE) to cleaning up spills in the office break room, entities have a responsibility to keep people safe.

However, when a CEO says his number one priority is zero safety incidents, I know it is a lie. I know that because I can guarantee zero incidents tomorrow by shutting the company down today.

The suggested shutdown of the company is ridiculous, but at the same time highlights that the priority of the CEO is making money. That is the reason there is a business. The

reason I am working for the CEO is to make money to support my family. To return to my family at the end of the day, my priority is working safely.

I put work and safety together because safety without doing something is meaningless. As seen with my shutdown suggestion, anyone can be safe doing nothing. Worse, when your goal is zero, one incident defeats that goal. Very small things, like a paper cut that draws blood, are incidents. In a zero-incident, I don't want to be hated by everyone in the company for messing up goal zero environment; you look around, quietly wrap a tissue around your finger, slip down to the bathroom, discreetly wash off the blood, and go about your day. Rightfully so, say most reasonable people about a paper cut. Absolutely not rightfully so, says the safety professional if they catch you with that bloody tissue and you aren't headed for the safety office to file a report.

To achieve goal zero, a finger pinch or even the removal of the end of a finger when screwing the top on an explosion-proof enclosure is ignored. When someone slips, trips, or falls in the parking lot, they first pop up to check if anyone saw. Then, they make sure no bones are broken. If something is broken and no one sees, there is a quiet trip to the emergency room, and the next day, a story is crafted about falling off a ladder at home. Goal zero, rather than generating a culture of safety, generates a culture of lying.

A noted example of a safety incident and the impact on employee wallets was at the Tesla plant in China where Elon Musk is said to have stolen employee bonuses. The story of Tesla and most large corporation bonuses is that there is a blend of corporate and individual employee goals. The corporate rating is a multiplier for everything else. The goal starts at 100%. It may move up a little for a great year, but for a failed corporate goal, there is a deduction. With safety as a number one priority, as the CEO said, it is ten or twenty per cent of the portion of the corporate goal. Does anyone else find it ironic that the number one priority accounts for only ten or twenty percent?

Failing goal zero for a paper cut might only hit the corporate multiplier by one percent. Part of that stems from the fact that the CEO's bonus is impacted by corporate goals, and you wouldn't want a paper cut to take away too many of the CEO's millions. In the case of Tesla China, a person died, and the news media focus was on hammering Elon Musk for stealing employee bonuses. The same news media quoted slighted employees, "The death was the person's own fault and may have been intentional." The slighted person continues, "One action is no justification for taking money out of all the other employee's bonuses."

That is where the slighted employee and the media reports were wrong. Per most companies' bonus structures, a poor safety metric absolutely justifies the reduction of employee bonuses. Per the clearly written conditions, a

fatality takes a huge whack at that ten or twenty percent safety factor.

That is because for that one employee, they should never have been left alone where they could be solely responsible for their own injury or death. To avoid employees seeking self-harm, management actions should be done in a thoughtful manner that avoids making employees want to purposely step in front of a forklift.

In the case of Tesla, Elon Musk may be more inclined to truly desire safety than the typical CEO who is only saying what plays well for the cameras. Rather than have a carefully structured bonus where the CEO may still make a huge bonus even when the company loses money, Musk makes money only if the company makes money. That, of course leads to a paradox in the China case of whether full enforcement of the safety penalty was indeed a strong safety statement or a way to put more money in Elon Musk's pocket. In this case, I tend to agree with Elon Musk in saying, "Hey, a man did die here."

Considering the Tesla China case, what is the impact on a goal for safe work versus goal zero? First, there is no ten or twenty percent at the top of the bonus structure for safety. (I still love that; ten or twenty percent for a number one priority.) Then comes the tricky part that the safety guys will hammer me on. What did the person fail to do safely when they were killed? If absentmindedly killed while crossing an

aisle rather than when doing work, this supports the slighted employee complaint that it should not impact everyone's bonus. If killed in the act of management-supported light bulb changing using trapezes and flying without a safety net, that should impact an entire corporation that allows such activities.

For the light-changing goal, in a safe work versus goal zero structure, the safety evaluation is the job evaluation. Light bulbs must be changed. How do we get to the light bulbs? This work is done safely using an expensive personal lift. When someone chimes in that they can do the job cheaper by using a trapeze, the evaluation transitions to the flow chart block that asks, "Is that in line with working safely." Flow chart block points to "No," which points to selecting a safer, possibly more expensive option. The person lift option is chosen. The goal of replacing light bulbs is accomplished safely.

In a goal zero world, with the right, or more accurately, the wrong safety person, the evaluation is that working from heights, moving a large piece of equipment around people, and handling light bulbs way up in the air provide many opportunities for things to go wrong. As a safety professional whose bonus is impacted by more than 10 or 20 percent when an incident happens on their watch, their choice is prohibiting the changing of light bulbs. "What is the issue with a few lights not working?" the safety professional might say.

The issue in this case, as with any time safety first gets in the way of working safely, is that the lack of light impacts worker safety throughout the plant. Focus on goal zero for one task, eventually leads to a safety failure. Safe work rather than safety alone removes friction when work and safety are separate goals.

The goal of a safe work scenario is an honest evaluation of how to do work safely rather than avoiding work to be safe. Safety as a number one priority is a small lie for the CEO, but small lies are just a steppingstone to – How do you know the CEO is lying? His mouth is moving.

Be honest about safety and state it as Goal 100. We want to do 100% of our work safely.

Complete Cementing by Mid-March

Specific:	Complete oil well cementing
Measurable:	Yes
Achievable:	Done previously
Resource-Driven:	Keep costs to a minimum
Time-Based:	By Mid-March

Deepwater Horizon was a technological marvel. A floating ultra-deepwater drilling rig owned by Transocean, the platform ran in waters up to 8,000 feet deep to a maximum drill depth of 30,000 feet. The platform had produced deep wells, including the deepest underwater gas and oil well. The platform was under lease to British Petroleum (BP) working what was known as the Macondo Prospect, about forty-one miles off the Louisiana coast. At a depth of five thousand feet, the exploratory well started in February 2010 was well within the rig's capability. Cementing completion and well sealing would precede expected production facilities set for later completion. While cementing is a common drilling task, it is something that was problematic for Transocean in the past. Part of the issue may have been the tendency to use third-party laborers for this critical task. My personal witness of this tendency at other companies was that having third parties do challenging work

avoids firing company direct employees when the challenging work goes wrong.

Another Transocean issue involved Blow Out Preventers (BOPs). These are specialized devices used to seal wells to prevent the uncontrolled release of oil or natural gas. In addition to product release, the BOP may also prevent the well from ejecting the drill casing. The operation of the BOP is by hydraulic force. Hydraulic leaks or incorrect hydraulic connection, as suspected at Macondo, can result in mis-operation.

Depending on the regulations for the site, multiple activation sensor options may be employed, including dead man switches and acoustically activated triggers. Of note, while Norway and Brazil require acoustic triggers, the Minerals Management Service regulating Macondo questioned its cost and effectiveness. The agency decided against that device because drilling rigs had other backup systems to cut off a well. All that said, forensic investigation of the Macondo shows the activation means did not matter due to a buckled pipe that prevented the operation of an activated BOP.

It was later learned that the well's BOP was damaged in a previously unreported accident in late March. This leads us to a discussion of worker concerns about safety practices. Employees feared reprisals for reported mistakes or

problems. Fake data circumvented the system. As a result, the company had a distorted belief in safety on the rig.

On April 20, though the operation was running five weeks late, the BP Vice President of drilling was on the platform for the annual goals review and to celebrate seven years without a "lost-time incident." A sad irony is if the mentioned data had not been faked, there would have been no safety celebration. Think about it, notice of the VP coming is known months in advance of the date of the seven-year anniversary. Then you or someone who works for you has what fully meets the criteria of a lost time incident. Who would want to be the pariah responsible for the cancellation of the VP visit and seven-year celebration? There would be no such worries for anyone related to a celebration of an eight-year anniversary.

While the VP was doing his safety speech, rig instrumentation began to show signs of an impending blowout. Rather than taking extreme shutdown measures that would prevent the achievement of goals, BP chose riskier paths in hopes of saving time and money, as well as not creating a scene while the VP was there.

Were there people who could have applied stop work authority to prevent the accident? The answer is yes, but the mentioned reprisals come to mind. To that, every manager at every level of every major corporation would tell you there would never, never, ever be a reprisal for an employee

who senses unsafe conditions and acts to stop the job. That sounds great, except as an example, the petrochemical company I worked for had a structure in which employees with an average, good rating received a below-average bonus. Without a single negative comment on a review, an employee's bonus could be 14% less than average. As the final cheap shot, there was a requirement that the group average rating be a 1.04 bonus multiplier. If there were excellent people in the group, for those who had to bring down the average, a late training completion or an opinion that "the employee did not play well with others" produced a 24% or worse hit to the bonus.

In a seminar, when asked if we thought *Deepwater Horizon* personnel did not say something because they were afraid of losing their jobs, I raised my hand and said, "They were just afraid of impacting their bonus."

Sell Six Bird Cages Each Day

Specific:	Sell Bird Cages
Measurable:	Six
Achievable:	Yes
Resource-Driven:	Interesting thing about that
Time-Based:	Each day

When I was a young engineer, I collaborated with an older engineer from Indonesia. One evening, we were on the road enjoying wine at a lovely little Thai restaurant. He told stories about growing up poor. His first encounter with Americans was as customers for handmade bamboo bird cages. He said he figured out a way to decrease resource costs and increase profits.

Instead of working late into the night building bird cages to sell the next day. He went to bed early. He then got up early and stole other people's bird cages.

Complete Natural Gas Facility in 1975,1978, 2003, 2008, 2014, 2022

Specific:	Complete Natural Gas Facility
Measurable:	Project substantial completion
Achievable:	Generally
Resource-Driven:	Original completion budget
Time-Based:	By years mentioned

Natural gas is a fickle bedfellow for projects. I first discovered this at my job as a cooperative education student at a Georgia textile mill. Natural gas supplies had gotten tight, and prices were increasing. As mitigation, utilities offered lower interruptible rates to industrial customers who used gas year-round rather than just the winter when residential demand increased. To prepare for outages, the commercial customers installed alternate fuel sources to cover interruption periods. Three alternate fuel sources for the plant where I worked were fuel oil, propane, or gasified propane that equipment could use just like natural gas. The last choice is the best. You get the interruption call, turn on the gasification system, switch the valve from the utility to the gasification system, and there you go.

My plant invested in the premium choice. They bought a 20,000-gallon propane tank and the gasification equipment.

The problem with the premium option was that the gasification system was complicated and never really worked. This complicated system consisted of a maze of pipes, valves, and instruments enclosed in a corrugated metal building. Though the building was about ten feet by twenty feet, only one person could fit at a time. The second person was near the door to hand in tools or provide rescue/go for help in the event of an emergency.

The story that occurred before I started working at the mill was that two men were at the gasifier around shift change. The evening shift man walked out to see if he could help/replace one of the two at the gasifier or just tell them it was time to go home. Surrounding the propane tank and gasifier was a bed of pea gravel. The night guy thought it would be clever to take a handful of pea gravel and toss it on the corrugated roof of the gasifier. The machine gun-like clatter caused the guy inside the gasifier to execute a full sprint through the door in which the watch person was, unfortunately, squatting. The watchman flew backward to land on his back in the gravel, which fortunately provided a soft landing. All had a good laugh while the two from the gasifier began their plans for a retaliatory prank. I think about those guys when I attend safety orientation meetings where rules say any horseplay at a modern plant will result in immediate dismissal.

When I joined the crew at the mill, they had given up on the gasification and were completing the installation of a fuel

oil tank. A new larger boiler had both natural gas and fuel oil burners with the ability to switch from one to the other with the flip of a switch. Of the three smaller existing boilers, one was permanently on natural gas, one permanently on fuel oil and the third had a rapid exchange of its burner performed any time we got the interruption notice. By the end of my three years of alternating quarters at the facility, I could swap that burner as fast as the best of the maintenance crew. During my last quarter as a co-op, a larger fuel oil tank, which ate a large part of our maintenance budget, was finished and filled with equally costly fuel oil just before getting notice from the utility that curtailments were no longer needed because of plentiful gas.

Around that same time, to address the natural gas shortage, a multi-billion-dollar facility in Maryland for offloading natural gas held in a liquified state at cryogenic temperatures was built. The premise was that cheap gas from Algeria would offset the cost of the facility, transportation, and gasification of the liquid.

Gasification, you say? I ponder, stroking my chin and thinking of the guy tumbling into the pea gravel. This is a different technology, but nonetheless, our next encounter with natural gas as a fickle bedfellow for projects. When the project was proposed, the Algerians gave one price. After the project, the Algerians gave a quite different price. Very few loads shipped before the facility was mothballed until liquefaction equipment was added in 1994 to convert

domestic products into Liquified Natural Gas (LNG) for storage to address periods of greater demand. Cheap, plentiful gas returned the facility to mothballs.

Cheap, plentiful gas meant you could generate electricity for less than utilities. Natural gas-fired generators rose anywhere emissions restrictions were loose. Plentiful sources of electric power brought electric rates down to mothball the gas generators.

The project I started working on in 2002 was a twist on the generator theme called co-generation. To improve efficiency, the heat from the generator stack is used in heating and cooling. “Heat used for cooling?” you say. A marvelous device called an absorption chiller uses a thermochemical compressor rather than a motor-driven compressor. This is a great application for summer waste heat if the supply is consistent. Consistent was how the generator ran while the engineers were still in charge, but then the financial professionals took over.

As happens on projects with payback based on a predicted cost of natural gas, returns based on predicted $4 per MCF gas rates fell into the basement when the gas cost was $8 per MCF upon completion. Electric rates dependent on the more stable price of coal stayed relatively constant. I say relatively because, as Texans on variable rates learned during the deep freeze, the cost of electricity is an ever-changing number based on how much is needed and how

much people are willing to pay. It was the same thing for the co-generation facility, but not as bad as the $10,000 electric bills Texas households saw after the deep freeze.

The financial professionals found a program that helped watch electric rates, and when they were up, they started the generator to capture the windfall. Within the couple hours it took the absorption chiller to warm up, rates dropped, and the generator was shut down again. The financial professionals proudly displayed their generation profits without mentioning higher overall operating costs due to running electric motor-driven chillers to produce the cooling that was supposed to come from the absorption chillers. A better brand of financial professionals looked at the generator's profit and cost of operation spreadsheets at the same time, which resulted in the mothballing of the generator…until gas prices went back down. Then they got the generator out of mothballs and added another generator just in time for gas prices to go back up…

After my layoff due to an unfortunate downturn in the economy, I moved on to an engineering consultant to find LNG regasification facilities were again all the rage due to the high price of natural gas. There were seventy-five of these facilities proposed for construction in the United States. Three units constructed in the seventies, including the Maryland location, came out of mothballs. Seven new facilities rose with completion, coinciding with a drop in natural gas prices. The facilities went into mothballs, but

with low natural gas prices, it would now be profitable to liquefy locally produced natural gas for export. Construction began on the liquefaction equipment at the sites. I pause here to say these are something other than cheap. The cost is in the billions and construction timelines in years. At least one liquefication facility came online before gas prices rose again. With volatile gas prices and facilities having both liquefaction and gasification capabilities, my tennis buddy LNG executive, and I joked that the way to make money was loading a ship today at $4 per MCF and just as it is about to reach the Panama Canal, turn it back around and offload it at the same facility for $5 per MCF. As it turns out, this does not actually work because when they install the liquefication equipment, they mothball the gasification unit. Liquefication could happen at Sabine Pass and gasification at Corpus Cristi? Just a thought. LNG executives are welcome to take that idea for free with no royalties expected.

Moving on, I noticed the first export facility was serving four ships per day. The docking facilities at the site could manage ten ships a day while LNG production capabilities were being expanded to the equivalent of two hundred ships per day. There is money in the building of the LNG facilities and people interested in funding construction projects that often go bankrupt. After bankruptcy empties investor wallets, companies like Berkshire Hathaway buy billions of dollars of equipment for pennies on the dollar and then sell it at a nice profit to someone else who sees that, with the predicted price of natural gas, they can make a lot of money.

Complete Hotel by 2003

Specific:	Yes
Measurable:	Yes
Achievable:	Absolutely
Resource-Driven:	Plenty of resources to build hotels
Time-Based:	By 2003

In 2001, I had a 19th-story window office overlooking the west side of Houston. In the distance, my coworkers and I watched as the 8th Wonder of the World, the Astrodome, was eclipsed by the new retractable roof NFL stadium. The eclipsing was both figurative and literal as from our vantage point, the older stadium disappeared as the larger, more modern stadium completely obscured our view of the dome. Years later, the Astrodome still stands next to NRG Stadium. We joke that, like Rome, the signature structure of our city is a crumbling stadium.

From our lofty perch, we also noted foundations, plumbing stub-ups and then a framework rising from the ground for an economy hotel. We then saw foundations, plumbing stub ups and then framework rise for another and another and another. All told, over a period of a couple years, we watched the construction of 12 hotels/motels/extended stay suites along about a half mile of Beltway 8. My guess

was that a marketing survey saw a need for economy accommodations at the intersection of Westheimer and Beltway 8. I understand those that began construction shortly after the first, had a full head of steam and could not stop. The other eight or so could have stopped, but somebody had a SMART goal and up they all went. Following one grand opening after another, we saw parking lots that were rarely more than half full. Places closed and changed names within a year of opening. A couple were torn down. I think one no-name inn was torn down for replacement by a major chain lower-end brand. Someone in the marketing department of that group was cleaning off his desk and found a long-buried survey that noted a particular area of Houston that needed cheap accommodations.

So, if you are ever in Houston for a major event and having difficulty finding a room, check out the West Chase area. There is always plenty of affordable hotel space.

Start Test on December 17

Specific:	Start Test
Measurable:	Test Start
Achievable:	Most said no
Resource-Driven:	Equipment and people were needed
Time-Based:	December 17

The focal reason for SMART goals is evaluations, merit raises, and bonuses, which need metrics against which to base judgment. As measuring capabilities increased with the advent of the computer spreadsheet, manager's familiarity with employee activity decreased. Self-determination of goals became commonplace. In fact, completion of goals by a given date, March 1 as an example, is often a SMART goal for managers, which is passed on to employees with a related but earlier date.

Given that these goals affect the money in employees' bank accounts, there is a bit of strategizing involved. The first trick is including completed tasks. With challenges completed before the goals are turned in, the few items left for the rest of the year are slam dunks like scheduling all vacations by July 15, attending the yearly engineering conference in September, or completing the yearly evaluation by October 1. For the clever, six completed goals

started the ten required, two goals were the goals, and two additional tasks made a perfect year.

While test start-up by a specific date is a textbook SMART goal and significant undertaking, the task was completely off the record because the concept of the subject of the test had not been introduced until May and only gained traction in August when I slipped it into a project spreadsheet where it produced a one-billion-dollar cost reduction. After that, nothing happened for a while except a request for me to produce an estimate for production and initial testing of a prototype.

When my cell phone rang after 5 o'clock, I picked up to find my boss and his boss on the phone with the chief of development. I suspected something was up. When my direct boss, with whom I had a tenuous relationship, said they wanted to talk about my proposed device, I knew something was up because he hated my idea. (One of the reasons we had a tenuous relationship.) The way my idea saved a billion dollars was by replacing the device that he had developed. (And now we know the rest of the story.)

The question asked on that first week of October call, made shortly after my boss discovered his budget goals required him to spend $100,000 before his own review on the 15th, was if I could produce the first prototype and start operational testing on December 17.

Given that delivery of a standard device was sixteen weeks without mention of the programming for the custom controller, this ten-week schedule was more than borderline ridiculous. Also, knowing my boss was involved, combined with an earlier overheard conversation about end-of-year excess funds, I knew he saw the project as a win/win that would dispose of excess cash while also setting me up to have egg all over my face. And did I mention that at least one industry expert had said my contraption would not work? Caution went to the wind as I was filled with pride by finally hearing support for my concept. Part of that pride was tied to knowing I had a plan that would get everything done in the specified time. Oh, and I was, saying this slowly, pretty sure that what had never been done would work.

Certain challenges were almost comical. The only manufacturer capable of building my prototype was not on the company-approved vendor list. I called an approved distributor and asked if they could help. They asked me to send them the manufacturer's proposal. Five minutes later, they returned the PDF proposal document edited with their company header and a 10% increase in the price. Having caught the manufacturer at a slow time, they agreed to deliver in 8 weeks what we had already designed.

I, and the site technicians, did some clever things to have everything ready for the prototype to get hooked up and begin operation immediately upon arrival. After doing a factory acceptance test in Mississippi two weeks before the

17th, I held my breath as the crew chained the prototype to a flatbed truck headed down the road to Houston while I caught a flight to Cincinnati to wrap up controller programming.

Back on site a week later to wrap up the last details, I went to site management to schedule operators for the test. The managers sheepishly looked at me and said, “We never thought you had a chance of getting that thing ready, so we let everyone take vacation for the rest of the year.”

I would have been very unhappy if this had been an actual goal rather than an off-the-record task. Instead, I shrugged and went home to spend my own use or lose vacation and spend some time with my family at Christmas. Everything sat for ten days until a night operator short of leave and desperate for overtime pay came back from vacation on the 27th. We were able to start only because I agreed to work the 12-hour night shift to provide the required second person on site. That is right, only 2 people in an oil and gas research facility with a normal occupancy of nearly 60. Because I was the only one who knew how the device worked, I also had to be there for the first start-up. I, therefore, worked the first 24 hours of prototype operation. The irony was, the morning after my second night, which had followed a 12-hour break, a safety guy back from vacation asked me how long I had been there to make sure I did not exceed the company limit of 14 hours straight that night. Thanks to his diligence, I got out of there just before

the clock hit 14 to avoid what surely would have been logged as a safety incident.

We completed the three weeks of constant operation required to include the prototype and its one-billion-dollar savings in the presentation to the big project review board on the first of February. My boss was a bit sullen, but on the other hand content that he had already ensured my yearly bonus would be 14% below average. People I hardly knew put me in for special merit bonuses. Tasks related to prototype testing completed after January 1, including the one-billion-dollar budget reduction, were one or more of ten SMART goals included by not only site personnel but also those at corporate when goals for the new year were turned in on March 1.

Complete One Dam by 1926

Specific:	Build a new dam
Measurable:	Yes
Achievable:	A similar dam had been successfully completed
Resource-Driven:	Keep costs to a minimum
Time-Based:	Per the construction schedule

Mulholland Drive, whose most famous part winds up the Hollywood Hills from US-101 to I-405, is known for its scenic overlooks and mansions of the stars. The drive derives its name from William Mulholland, who managed dams, reservoirs and aqueducts that brought the water that allowed Los Angeles to become the largest city in California.

With today's strict engineering licensing requirements and demands for professional engineering seals on structural permits, it is a bit surprising that Mulholland was a self-taught civil engineer. He none the less developed innovative techniques still used in dam construction today. His ideas were adopted by degreed engineers for projects such as the Panama Canal. In recognition of his accomplishments, Mulholland received an honorary doctorate degree in 1914. At the height of his fame in 1923, the City of Los Angeles

chose the name Mulholland Drive for a new highway that ran along the spine of the Santa Monica Mountains.

Along with greater fame came larger projects. Greater water requirements led to the building of smaller reservoirs. The Hollywood dam that would bear Mulholland's name started in 1921. A site for an even larger reservoir was sought, but the preferred site in the northeast San Fernando Valley was on prime real estate that the city could not afford. Focus returned to a federally owned site. Twelve years earlier this site was rejected because of a severely laminated mica schist. However, the city needed water. New exploratory shafts conveniently showed the San Francisquito Canyon site would provide the structural support needed for a new dam.

A further benefit of the location was dimensional similarities to the new Mulholland dam, whose schedule was about a year ahead. That provided the further cost and schedule benefit of adapting the Mulholland design and calculations rather than working from scratch. In such a situation, there was undoubtedly a temptation to simply copy elements to save the cost and time of creating a design and performing project-specific calculations.

Calculations, however, were done that showed that the reservoir capacity could be increased by 20% if the dam's height increased by ten feet. Today, a ten-foot increase in the height of a dam like this would demand a restart from

scratch. With only minimal calculations, ten feet was added to the main dam along with a near six hundred foot long, ten-foot-high wing dike.

With the dam's completion in early 1926, the reservoir began to fill. Cracks developed, and seepage was noted as typical for a dam of this type and size. When the level reached the mica schist, seepage increased. Given the quantity of seepage, the clever dam keeper installed a two-inch pipe to provide his home with running water, which was a luxury at that time.

The level of the reservoir reached the original dam design height of 175 feet, and though there continued to be seepage, data recorded for 1926 and 1927 by people whose reputation may or may not have been linked to the dryness said it was an exceptionally dry structure. With the escalation of the California water wars, aqueducts were destroyed, and the St. Francis reservoir's existence was extremely fortuitous as it provided critically needed water to Los Angeles.

Water continued to rise until it was within one foot of the top of the dam. Cracks appeared in the hastily designed wing dike. Water flowing down the face of the dam alarmed residents. Mulholland and others inspected the dam. They agreed that mitigations should be done at some time in the future. Five days later, just before midnight on March 12, 1928, the dam collapsed. The power plant just below the dam

and the dam keeper's home a quarter mile away washed away at once. Shorting of the wires to the power plant caused a transformer ten miles away to blow up.

The homes of dam workers a mile and a half below the dam were submerged under over one hundred feet of water, with a loss of sixty-four lives. Less than 15 minutes later, the water reached an Edison Company temporary construction camp where eighty-four died. Close to an hour later, the wall of water reached the substation with the blown-up transformer. Though the water was moving at only twelve miles an hour, at a time when many did not have a telephone, lives were taken more than 40 miles away hours after the dam's failure. Bodies washed into the Pacific Ocean 55 miles from the dam. Corpses were found floating as far away as Mexico.

In 1929 the state of California passed laws to regulate civil engineering that created the Board of Registration for Civil Engineers. William Mulholland was not asked to join. When those above reproach focus on goals without proper checks and balances, the best of intentions can go awry. Over four hundred people were confirmed dead or missing after the collapse of the St. Francis dam, which, as a project, was successful in terms of timeline and construction cost.

Revise the Recipe for the World's Most Iconic Soft Drink

Specific:	New Formula
Measurable:	Yes
Achievable:	But will people drink it?
Resource-Driven:	People are resources
Time-Based:	April 1985

In 1985 Pepsi advertising focused on blind taste tests that showed consumers preferred Pepsi over Coke. Coke complained that in taste evaluates the sweeter choice is always selected. That is why, at wine tastings, they always move from driest to sweet.

With complaints falling on deaf ears, Coca-Cola decided to fight sweet with sweet and revised the tried-and-true Coca-Cola recipe. The American public reacted negatively to New Coke. People were desperate for the old Coke, which was reintroduced three months later with the name "Coca-Cola Classic."

This resulted in a significant sales boost that raised the question of whether it had all been a stunt to stimulate sales of the original Coca-Cola. Ready for any Pepsi taste tests, New Coke carried the Coca Cola label until rebranded as

Coke II in 1990. Dropped in 2002, New Coke reminds us that if it ain’t broke, don’t fix it. On the other hand, Pepsi quit doing the taste test commercials.

All Renewable Power by 2040

Specific:	Get Rid of Those Nasty Fossil-Fueled Plants
Measurable:	Fossil-fueled plants down to zero
Achievable:	???
Resource-Driven:	All the money in the world is available for the environment
Time-Based:	By 2040

I was excited about the concept of wind power when I did my college technical writing term paper on wind turbines at a time when the first 2-megawatt (MW) unit was being commissioned in Boone, North Carolina. This American unit shared with Vietnam-era Huey helicopters both a two-bladed propellor design and that propellor's annoying whop, whop sound. This was something that few people wanted to see or rather hear. Later that year, however, with the help of aeronautics specialists, German designers introduced a quieter three-blade design that is the basis of most wind turbines in the world today.

Those, like me, excited about renewable power must note challenges illustrated in a couple simple but true statements:

1) “Solar power only helps 50% of the time.” This refers to the fact that solar only works when the sun is shining. Fifty percent is a bit of an exaggeration because available energy varies during the day and may be blocked by clouds.

2) “If wind power was dependable, oil tankers would have sails.” Fuel is as much as 60% of total ship operating costs. For large tankers, fuel costs would cover the cost of a 2 MW wind turbine in months. However, that wind turbine would only replace about 4% of the power required by the tanker. Rather than complete wind turbines, tanker wind propulsion solutions focus on innovative rotor sails or something like an inflatable sail being created by Michelin. With great minds doing wonderful things towards these developments, present best-case wind augmentation results in a 10% reduction in fuel usage. Boasts of future 20% or 30% fuel reduction will be believed when seen. Few of the technologies have progressed to the point of discussions about the impact on maintenance or crew costs versus fuel savings.

For grid-connected renewable sources, the three most plentiful varieties are hydroelectric, wind, and solar. In the early days of electricity, before the term renewable energy, hydroelectric power was the focal source of power. Niagara powered the majority of New York for years, and today still

provides 22% of the electricity required by that state. At Niagara Falls, the huge natural flow allows partial diversion to the power plants with almost imperceptible changes in the appearance of the falls. Other hydro projects faced public outcry over the flooding of pristine valleys or the blockage of natural paths to salmon spawning grounds. However, in a time of lesser ecological and political power, salmon ladders and the benefits of miles of lakefront property overcame protests in the name of the greater good.

With only so many valleys to flood and with increased demand, hydroelectric power has fallen to less than 10% of total power consumed by the United States. Though to a lesser extent than other renewable sources, hydroelectric power follows the whims of Mother Nature. If there is a draught, there is less. If there is a huge snow melt in the mountains, there is more whether you need it or not. Hydroelectric production is often secondary to support of lake water levels for recreational purposes.

Hydro offered the first energy storage capability with reversible pump generators to move water back up to a reservoir when there was excess power and then flow back through the generators during times of highest demand. Pump storage has gone through a series of heydays starting with the huge inrush of power from the Tennessee Valley Authority series of damns in the 1930s. Small pump storage facilities were then built in the Appalachians. In the late 1970s and early 1980s, when nuclear power plants were

going to make energy so cheap that "you wouldn't have to meter it," the Bath County Pumped Storage Station was built in Virginia. Though this facility uses more energy to pump than it generates, it theoretically allows nuclear plants to run continually at full production while flattening electricity demand curves by its 2,100-megawatt (1,000 wind turbine generators) load/generation capacity. When the Three Mile Island nuclear facility to the north in Pennsylvania shut down, the operation of Bath County was curtailed shortly after completion. With wind turbines as a new source of possible excess power, between 2004 and 2009, Bath County expanded to over 3,000 megawatts.

The new kid on the storage block is the Battery Energy Storage System (BESS), which consists of shipping containers full of overgrown laptop batteries and the electronics that turn battery DC output into the AC power for the grid. With no more than a two-hour backup, these batteries offer an opportunity for excess renewable power to spin meters to produce renewable energy credits. The batteries also provide near instantaneous support for the highest short-term utility peaks and provide time for the startup of standby natural gas generators, known in the industry as "peakers." The rotating equipment, which may have a 20-minute spin-up time, can then take over for longer-term support to cover challenges like the twelve-hour gap when solar sources are off-line.

As a sexy new thing, BESS facilities have drawn holding companies and investment bankers like hogs to slop. That means financial professionals running electrical equipment once again. What is even more fun, as compared to 20 years ago, is that with fast computers and new internet AI answers, today's financial professionals can be certain that they know more about electricity than a professional electrical engineer with 40 years of experience. Quite frankly, it led me to the decision to retire from active engineering completely.

That is not to say it was not without some fun. As an example, an owner's representative, as the financial professionals are known, called my firm to ask if we could come to his site to fix his system that was displaying a round-trip efficiency of only 85% rather than the 95% promised by the battery storage equipment sales representative. Realizing that my laughter at that point was inappropriate, I tried the old disguising laughter as a cough trick.

I at once realized the failure in my disguise when the potential client very sharply asked me if I had something to say. I slowly nodded my head, which went unseen because I did not have my video camera on. Regrouping, I asked if he could share the losses provided by the vendor, which he did. I then carefully said, "I'll begin by saying I don't know your system specifics or how much better your new equipment is than what I have operated in the past. However, if asked by someone who would sue me for liquidated damages for over-promising, here is what I would say about the numbers

provided by the vendor. A half percent each way for cables is good. One percent each way for the transformer is good. One percent each way for the inverter is optimistic. I would say three, so add 4 percent to your five. What did the vendor say about the batteries?"

"They didn't include the batteries," said the potential client.

"Did they say why not?" I asked.

"I don't recall," was the answer.

"Add four more percent for the battery round trip," I instructed.

"Wow, four percent!" the potential client exclaimed.

"If I was going to get sued for a bad answer, that is what I would say," I replied.

"Were aux loads included in the losses?" I asked.

"Aux loads?" questioned the potential client.

"Okay, no aux loads," I said slowly, "Let's add an additional two percent to the round trip."

The potential client then ran quickly through his original number along with what I provided. Proving that financial professionals are indeed good at math, he summed, "15

percent. Subtract that from 100 percent, and we get … 85 percent."

"And the numbers your meters have indicated at the site?" I questioned.

"85 percent," said the person who no longer needed my company to do thousands of dollars' worth of monitoring and associated reports. My bosses were not all together pleased with me.

Things were quiet at that point because, in a world where margin percentages can be in single digits, a ten percent difference is a real fudge up. I wish I could say this was the only financial professional I talked to who expected better than 85% round trip efficiency. For me, the worse call was when a vendor company associate acting as a client third-party consultant asked me to change my round-trip losses calculations to drop the batteries and aux loads that were not part of the inverter package. At least I then knew the modus operandi and guilty party behind the bogus numbers from the earlier potential client call. With professionals in the industry who may lose jobs or companies falling for rosy promises, there should be no shame for lay people if a bit of renewable energy wool has been pulled over their eyes.

(Taking a detour here, like LNG plants, battery storage sites are one of the latest things that cause the moderately informed to rush out to build expensive facilities that will bankrupt a company in short order. I wonder how this

continues to be a working model. The executives of the companies seem to do okay. Though the company goes bankrupt, experience in the renewable energy sector will ensure a quick return to employment. People who sell expensive equipment seem to get their money. People who design and build expensive projects appear no worse for the wear. Berkshire Hathaway loves it when they can buy a facility for pennies on the dollar to enable profit with 85% round trip efficiency. The people taking the hit are fresh faced investors who look to turn a big profit while supporting a worthy cause like renewable energy. Supporting a cause, I suppose, and getting the satisfaction of seeing the successful completion of a SMART goal.)

Losses of BESS facilities or pump storage skew both overall usage and generation numbers. For the BESS sites, co-locating with a renewable source like wind turbines or solar would be better for the environment. Rather than the 1% transformer losses to put the renewable power on the grid and 1% transformer losses to charge the batteries, those 2% losses, about 400 houses worth of power, could be saved. Co-locating on the DC side of a solar site, the savings might be 6% which for a 100 MW site equates to 6MW which at 1000 pounds of CO2 per MW is three tons of CO2 per battery cycle added to the environment. (Three battery cycles per day are expected.) Those dollar and CO2 savings, however, are foregone to spin meters that generate renewable energy credits that justify charging green energy clients 14 cents per kWH rather than 10 cents.

Excess wind power to BESS sites or Bath County pumps counts 100% as renewable wind power contribution by providing increased demand when the wind decides to blow. Bath County's generation output counts 100% as renewable hydroelectric contribution to the system. Both these skewed production/use numbers are an important part of renewable economics because the 100% renewable contracts of green energy providers are based on renewable energy credits rather than a direct path from renewable generation. That way, at night during a drought when the wind is not blowing, lights for green energy customers stay on thanks to your kindly neighborhood coal plant. (There it was. The first coal plant mentioned. Please take the time to glue the top of your head back on. While you are at it, fasten your seatbelt; the rest of this chapter is going to be a bumpy ride.)

Double dipping and inefficiencies of energy storage are the less objectionable ways to pad renewable credits. The worst is connecting load banks directly to renewable generation to blow heat into the atmosphere and spin a meter when there is no customer for the energy. (And no, blowing heat directly into the atmosphere does not cause global warming.) Less objectionable is using excess energy in the inefficient process of water-to-hydrogen conversion. Ironic is a process that uses excess electricity to convert CO2 into methane to turn renewable energy into fossil fuel. The bottom line is that if green energy service providers and their requirement for renewable credits went away, energy

consumption and pollution due to energy production would go down.

Fuzzy economic math aside, we begin the discussion of the fuzzy math to get to 100% renewable power. At the present time, hydro provides about 10% of electricity, solar about 3% and wind about 11%. How do we get from 24% to 100%? The first step is building more wind turbines, if that is even possible. Texas, for example, has wind turbine generation capacity that matches 57% of the state's electric usage. Production and capacity are two different things, with the actual contribution of about 20% of state usage. That 35% of capacity contribution shows excellent turbine siting in Texas. For the United Kingdom, as another example, the turbine rating versus production factor is only 25%.

To get to 100% of consumption, we need five times the 18,000 wind turbines presently installed in Texas which already has more wind turbines than any other state. And we have been talking about average consumption versus peak which is about 50% higher. Also, consider the two times of maximum peak usage are hot summer days, which can be very still wind-wise, and very cold days, which can be very still wind-wise. Adding solar to that conversation, hot days may also be very sunny days. However, when a solar panel gets too hot, its production diminishes. And, as for solar helping with peaks caused by cold, we all know it is coldest when it is dark.

When Texas had major power outages during times of extreme winter demand, it was made clear that it was in no way due to renewable energy sources. The blame was placed on fossil fuel sources that must be available within a moment's notice when the wind stops blowing. These sources are in two forms: the much-maligned coal plants and natural gas generators. (Pause for head gluing. You may just want to skip to the next chapter because I am about to get into the part about how your passion against plants, whose fuel source shall not be named, has directly led to increased CO2 in the atmosphere. Maybe I can soften things with the right choice of words.)

In defense of those who have had the top of their head blow off, the extraction of said fuel is one of the world's nastier processes. Entire counties in the Appalachians have been decimated. Ending that alone may be all the justification for banning black fuel-fired generators. On the other hand, as power producers, the much-maligned energy producers have been hard to beat. They burn cheap, abundant fuel to produce consistent power. Modern black fuel plants are 20% more efficient than their older brothers, with the sad fact that the United States has no modern coal plants because of a construction moratorium. (I said the word there because the problem is your fault. Pause for head glue on, and I will be nice from here on.) Further irony, when we criticize black fuel plants in India and China, those are modern facilities that are 20% more efficient than the nasty United States counterparts which means India and China

electrical production pollution is less than the un-knowledgeable claim. Unlike India and China, due to blind prejudice, the United States missed an opportunity to reduce CO2 emissions from energy production by about 10%. With numbers of not natural gas, not renewable plants down by about two-thirds from their heyday, those still running must run at the whim of the wind. When the wind blows, the fossil fuel plants must throttle back, which is something certain types of plants do not do well. A 20% output reduction drops efficiency by 10%. In other words, about half of the power of certain types of plants replaced by wind turbines is efficiency loss. That means the CO2 reduction credited to renewables is only about half what we would hope. (They are, however, still getting 100% of the energy credits for every spin of their Point of Interface (POI) meter.)

What has largely replaced the solid fossil fuel plants is natural gas generation. Before being too proud of our emissions reductions, might I make a quick reference to my earlier diatribe on the fickleness of natural gas as a financial bedfellow? Have you noticed how a chart of your electric bills, month to comparable month or year to comparable year, now have a sawtooth appearance? That, as opposed to the consistent price of the fuel that shall not be named, is our fickle friend natural gas in financial action.

So, when you can get natural gas at a reasonable price, there are two focal types: simple cycle and combined cycle. A simple cycle has an engine attached to a generator with

waste heat simply blown into the atmosphere. These units have an efficiency of around 33%. Combined cycle generators capture waste heat to produce steam to run steam generators. The fun math for these is that generation efficiency is now up to 70% measured at the generator output terminals but is about 50% once accounting for combined cycle auxiliary loads. (Including or not including aux loads. Hmmmm. Sound familiar?) Guess which number combined cycle generation plant salespeople use. Still, 50% is good compared to 33%, but the 50% only happens when the unit is running flat out with maximum heat from the gas turbine producing maximum steam for the steam turbine. When the wind kicks up, throttled back combined cycle natural gas generation efficiency may drop all the way to simple cycle, 50% to 33%, which again significantly reduces the expected CO2 reduction derived from renewable energy.

When the wind stops, the combined cycle units quickly return to maximum output and possibly resort to firing burners in their steam generators, which produces additional energy at simple cycle efficiencies. When all the normally running combined cycle and solid fuel units are back to maximum power, simple cycle units, the previously mentioned peakers, fire up with their 33% or less efficiency. Units that are normally offline, with CO2 output levels that can match or exceed plants whose fuel cannot be named, must start at a moment's notice for a less-than-optimal path to reliability. It was the marginally dependable peakers,

rather than renewable energy, that were the scapegoats for Texas going dark.

The saying goes that for every megawatt of renewable power, there must be a megawatt of natural gas generation to back it up. Wind proponents tell you that is not true and they are right. With wind turbine average output only about a third of the equipment rating and accounting for demand versus average consumption, there only needs to be about a half-megawatt backup for every renewable megawatt installed.

Limit Spending at Grocery Store to $150 per Week

Specific:	Limit Grocery Spending
Measurable:	$150
Achievable:	Absolutely
Resource-Driven:	$150
Time-Based:	Weekly

My wife, who is a lovely and intelligent woman (nice try, but I will still catch it for this one), came home from the grocery store with weekly staples along with two bottles of wine, which was all she could purchase while staying within her self-imposed weekly budget of $150. While budgets are beneficial, the issue with this SMART goal is that the purchase of six bottles of wine comes with a 10% discount. Focus on a specific short-term goal can impinge on a longer-term overall goal. In the case of short-term spending goals, the issue is increased overall spending.

Unless…

Long-term spending increases unless you know how much not getting that 10% wine discount bothers your obsessive-compulsive husband. In that case, you sweetly ask him to run to the store to pick up the tomato that you "forgot"

and possibly get a bottle of wine. The six bottles of wine he brings back with a proud show of the 10% discount will remove the cost of those bottles and the cost of a tomato from your $150 weekly shopping budget for the rest of the month.

Wait! Where did this come from? Who has been on my computer? - Paul

Deliver One Message Before Battle

Specific:	Deliver a message critical to winning a battle
Measurable:	Yes
Achievable:	Well within the capability of a rider on a horse
Resource-Driven:	One horse and rider
Time-Based:	Before the battle

For want of a nail, the shoe was lost. For want of a shoe, the horse was lost. For want of a horse, the rider was lost. For want of a rider, the message was lost. For want of a message, the battle was lost. For want of the battle, the kingdom was lost.

Imagine how small the horse maintenance budget was for the kingdom, but with a war on, you must cut back somewhere. With lots of horses and lots of shoes, securing shoes with three nails per shoe rather than four matters. That produces savings not only in nail costs but also in shoeing labor and horse downtime.

Both the extra money and iron from all those nails went into the latest and greatest of armor that the troops were

wearing when slaughtered in a vulnerable position because the message of the enemy's advance did not get through.

Don't sweat the small stuff is another way of saying "don't worry." However, there is a fine line between worry and planning or between small stuff and critical details. Worry and sweating are letting endless permutations spin around our heads and keep us up at night without taking time to consider solutions that will shut down the merry-go-round. A basic part of computer programming is the IF/THEN statement. When our heads are buzzing, even in the middle of the night, catch each thought as it flies past to turn it into an "IF." Produce the "THEN" or possibly a plan to address the "THEN" in the morning. One by one, tie down those troublesome neurons and go to sleep in preparation for implementing all your new "THENs" in the morning.

For something like the small detail of a horseshoe nail, study the tried-and-true practice of ensuring ramifications are understood before implementation. As a young engineer, I worked in a transformer factory alongside a more senior engineer. With a traditional product that had not changed much in fifty years, there was not a lot for us to do. My job was writing a manual for a new computer-based controller. I was supposed to duplicate the effort of a young engineer twenty years earlier. He had sat in a basement for months, meticulously failing and fixing every part of a non-computer-based controller. That produced a repair manual that was legendary.

Before I got started in the basement, a technician left an enclosure door partially open on one of the early field tests of the new computer-based controllers. There was a heavy dew, which caused the controller to shut down. As it turns out, the voltages and spacing on the old electronic controller meant a little dampness was acceptable. Experienced engineers solved the moisture problem by conformal coating the computer boards. (Read cover the board in green, rubbery gunk.) I went to the basement, failing or fixing components now meant battling a thick plastic/rubber compound. After trying to fail and fix only a few components, not only inexperienced me but experts from around the company and the world realized that the conformal coating made fixing individual components on the computer-based controller virtually impossible. The multipage, detailed repair manual became one page as we became one of the first adopters of the now ubiquitous computer-age solution; replace the entire motherboard.

My SMART goal of completing the repair manual was done early. However, the deadline for my supervisor's specific, measurable, achievable, realistic, time-constrained goal of finding me something to do after the manual was several months away. I, therefore, watched as my engineering officemate worked toward his goal of reducing transformer material costs by 1% by the end of the year. (Wow, three SMART goats in one paragraph. Pretty good, huh?)

At a time when computers were in their infancy, it took hours to run each iteration that calculated the impact of removing a little copper, a little iron, or both from a transformer. We spent time talking about deer hunting and my engineering cohort's early life in the Philippines.

Slowly, the design of the transformers was revised. Equipment to the new specifications began rolling down the assembly line. My supervisor permanently resolved his goal of keeping me busy by having me transferred to another plant. I was at another company when I learned that transformers built with 1% material savings had a much-increased failure rate. The company spent years and considerable money digging itself out of the hole by pulling older, more robust designs out of musty basements and building replacements for unreliable equipment. There is a question if the company's reputation ever fully recovered.

For lack of a nail…

Complete Engineering by End of Year

Specific:	Complete engineering for a Petro-Chemical Plant by end of year
Measurable:	Yes
Achievable:	If there are no significant changes
Resource-Driven:	Interesting that you ask that
Time-Based:	End of year

I always thought it a bit sad that the company I worked for did an employee survey every year got very similar answers every year (except the job stability answer varied on whether it was a boom year or one of those wonderful years with 10% layoffs) and the company never really addressed the comments. (Side note: knowing that improving survey scores must be someone's SMART goal I developed a strategy that never caught on but would still like to suggest it as a path to end bothersome surveys forever. My thought then and for every survey in the future is to give every answer the highest score. In the case of the company survey, after seeing great scores, management would be so intent on patting themselves on the back that they would dislocate their shoulders and be unable to sign any pink slips. After giving this a whirl, however, I was in a one-on-one meeting with my supervisor to review the results for our 8-person group. One question that we are about to talk about got the

lowest mark from everyone except for one incongruous, best mark. Laughing, I revealed my strategy to my manager. He did not laugh.) Every year, "Management makes decisions in an expeditious manner" got a poor score. I bring this up because that goes hand in hand with a project that went through a Final Investment Decision (FID) five times. We joked that with the company headquartered overseas, management lacked knowledge of the meaning of either the word final, decision, or both. ("We" may have been inappropriate in the earlier sentence. Though others may have repeated it, the comment is more accurately attributed to me. It may or may not have directly or indirectly led to my redundancy and my receipt of a healthy severance package, which now enables the carefree life of a happy retiree with time on my hands to write a snippy little book.)

Back to our story, we had been through a failed FID… SMART goals, most notably for the manager of project engineering, naturally assumed a successful FID. After one of the final decisions, the company board expeditiously decided to move the project schedule back by a year. One might expect the aggressive goal to complete project engineering by end of year would have relaxed. However, since SMART goals are SMART goals and dozens of people had them, engineering continued to move forward with the inclusion of contractor overtime to meet the end-of-year goals.

This was especially ironic because changes to project scope were a requirement for passing the next FID. Changes, however, would not become part of SMART goals until the next year's goals. At that time, many lines and text hurriedly entered on plans to complete current year goals, were erased or changed.

Alongside finishing engineering per the earlier scope, an added task, not a goal because it was after March 1 (same company as before with the March 1 SMART goal plan), was a modification of the plans to reduce cost by one billion dollars. (They did not care to hear how I once did that all by myself on a previous project.) For the present task, the decrease was through the reduction of production capabilities and details like the removal of backup generation. With considerable contractor overtime, both the goal and the task were successful. The cost of the project was reduced by one billion dollars to a penny. Things remained unsaid like the impact of a lost year of production. Ours was not the only plant of its kind that was based on marketing analysis indicating demand for the product, and the first online would have all that demand to itself until all three were on line and then making less than expected profit. Lastly, the project burn rate was one hundred million dollars a month. The project delay, reduction of plant capability, and one-billion-dollar savings came at a cost of 1.2 billion dollars.

(Further fun survey story; another question that got poor marks and made managers always ask, “Why did that get low marks? That would never happen.”

The question was, “Do you feel you would ever face retribution for something you said?”)

Advance Troops One Mile by Sundown

Specific:	Advance troops across one meadow
Measurable:	Yes
Achievable:	Successfully done in earlier battles
Resource-Driven:	Keep casualties to a minimum
Time-Based:	By Sundown

Confederate General Robert E Lee purported a SMART goal for General Pickett and others, who have been happy to let Pickett receive all credit, to cross a meadow to overtake a Union position.

Pickett's division was held in reserve at Gettysburg. Another general had troops which had fought lightly on in the previous days and others that had been in heavy fighting. That general got sick before selecting troops for Pickett's charge. Instead of selecting the well-rested troops, a stand-in's arbitrary decision put the troops just out of heavy fighting back in the lead for the fateful charge.

Despite hope for an early start, it took all morning to get signatures on Job Safety Agreements (JSAs). (Okay, they did not have JSAs back then, but the Generals were goofing off doing something.) Upper management had failed to consider the wisdom of getting an early start on a hot July

day. The real irony to that is that these were supposedly freaking southerners.

The battle started with a bombardment that was the largest of the war. Hundreds of cannons from both sides fired for hours. Quantity aside, the quality of the work was poor in part because of the smoke from all the cannons.

On the union side, the artillery chief ignored ego-based instructions to match the enemy shot for shot. Rather than stop altogether; however, he shut down guns one at a time to give the impression that the enemy was having success destroying his weapons. He thus egged on his opponents to waste ineffective shot after ineffective shot into empty smoke obscured farmland.

Convinced of a now weakened defense, the confederate force stepped off toward the Union positions in the peak heat of a July afternoon. While called Pickett's Charge, it was more of a parade march toward the enemy before a sprint after coming within the range of enemy weapons. This was a strategy that had worked well earlier in the war when the Union used smoothbore muskets with an effective range of only seventy-five yards. After a first volley, the Confederates would sprint to overtake union troops in the twenty seconds it took to reload the muskets. (Twenty-second reload, fifteen-second sprint, confederates win.)

At Gettysburg, more modern Union weapons included rifled muskets, repeating Sharps carbines, and lever action

Henry rifles. These last-mentioned weapons could fire seventeen shots between reloads. Besides more rapid fire, the newer weapons had effective ranges near 400 yards. In the three-hundred-plus yard difference between the range of the rifles and the old smoothbores, the Confederates were decimated. (Little or no reload delay, minute and a half sprint, confederates lose.)

Nonetheless, the much-maligned Pickett's troops spied a possible opening and took a different path. They withstood defensive fire and advanced to open gaps in the Union line. As they neared success, however, the Union artillery officer who had saved his ammunition loaded five cannons with grapeshot. This munition consists of clusters of metal balls that unleash a hail of projectiles onto the enemy. These are only good at close range, but having withstood over three hundred yards of rifle fire, Pickett’s men were at close range. When the five guns erupted, the entire Confederate line disappeared.

With no senior officers to call a formal retreat, Confederates began to slip away individually. When General Lee told Pickett to rally his division for the defense, Pickett allegedly replied, "General, I have no division."

Fire 20% of your employees each year

Specific:	Fire employees
Measurable:	20%
Achievable:	Absolutely
Resource-Driven:	Saves money by getting rid of dead weight
Time-Based:	Yearly

One reason companies have goals is so they can put measurements in a spreadsheet to quantitatively provide fair judgment of employees. This is to decide the level of bonuses, the percentage of raises or to determine those let go. If there was ever a goal for employee attrition, one would hope the number was zero. Contrary to best wishes, however, rather than an expectation of hiring and keeping good people, companies have the expectation of duds along with goals to get rid of them each year. To get rid of duds, companies set a specific goal of removing 20% of the workforce each year. Oddly enough, right alongside the manager's goals of removing 20% of the employees, human resources have a goal of hiring an equivalent of 20% of the workforce to keep things even.

In a classic case of a SMART goal gone awry, a large online retailer decided to evaluate managers related to a metric known as Unregretted Attrition Rate (UAR). The first and most obvious result was the creation of a “hire to fire” practice, which the company made clear was not an official policy. It was just a coincidence that if managers are given mandatory turnover goals, they tend to hire people with un regrettable characteristics that ensure a rapid departure. That way, the newbies go rather than current employees that the manager knows and likes.

The hire to fire practice, not official policy, from the point of view of the unregretted, has interesting twists. Once the public knows of the practice, not official policy, who would want to interview at the company? An easy answer is people who would like to be paid to do nothing. An adventurer looking to restock their bank account between adventures might like a temporary job. A more unfortunate possibility is a desperate person with bill collectors beating on their door. A scary possibility is that someone who knows they are a short timer may decide to earn that dismissal by throwing wrenches in every gearbox they can see. The most devious might focus on placing obstacles in the path of others to transfer their unregretted status elsewhere.

Meanwhile, regular employees must take care of business while working around the unregretted. Imagine trying a productive meeting with an unregretted Eeyore (Winnie the Pooh reference) moaning about everything from

the weather to traffic to coffee to the softness of toilet paper in the restrooms. While stressing and struggling to get work done, it is difficult to avoid animosity towards the guy who just drinks coffee and plays *Words with Friends* all day. That is unless regular employees are familiar with the 20% practice, not official policy. Then the productive employees silently shout, "Yes!" and fist bump each other while tilting their heads with a smile toward the cubicle of the unregretted. They experience a bit of relief that it will certainly be him and not them at the end of the year. That is unless "Why did you throw that wrench into the machine?" shouted by the site's most critical maintenance person, results in a negative "works well with others" mark on the spreadsheet of a middle manager who has met none of the people let alone learned what any of them do. Then the old "he who does nothing makes no mistakes" takes over with the critical maintenance person let go and the wrench thrower having to cancel his planned three-month adventure to Bora Bora.

Beyond the do-nothing path to good ratings, there may be no room for slackers. Work requires all hands. Divisions that cannot afford to have poor performers select the best they can. Those good people do well and help the company profit. At the end of the year, because of a policy of 20% turnover, good people who have done well for that division will lose their jobs just like the super slackers in divisions loaded with fluff.

A further sad part about letting people go is that status and contribution to progress can be inversely related. We could cut half the VPs, and things would be fine. Eliminate 20% of garbage men, and the world would go straight to hell.

Select The Boss of the Body by the End of the Week

Specific:	Boss
Measurable:	Selected
Achievable:	There may be a debate
Resource-Driven:	Not sure about that
Time-Based:	By the end of the week

The parts of the body got together to select the boss of the body. The legs spoke up, “We are the ones that move the body where it needs to be.”

The hands spoke up, “Ha if you get chopped off, I can push us around in a wheelchair.”

Then the heart chimed in, “Above all else, without me, there is no lifeblood.”

“What is lifeblood without the intelligence to do something with that life,” said the brain, “Surely all will agree that I should be the boss.”

Then, from the nether regions of the body spoke a grating voice, “Nope, I am the boss.”

“You!” exclaimed the brain, “You are just a poop hole.”

“You, the boss?” scoffed the heart.

“Fine,” said the poop hole and then shut down.

After a day, the heart consented. On the second day, as the brown rose into the whites of the eyes, the brain gave in, “Fine, fine, you are the boss.”

The poop hole released, and all was well with the body.

The moral of the story, you do not have to be a brain to be the boss, just a poop hole.

In the corporate world, of course, the poop holes are those who can constipate progress with petty bureaucracies or sloth-like progress when applying their required signatures.

Sadly, for some corporate poop holes, I, rather than conceding, would, with my last ounce of consciousness, do the corporate equivalent of commanding the hand to shove a scalding hot water enema up the poop hole. After some delay for cleanup of the following excrement storm, I would get my job done.

That is not to say this happened without a hit to my “plays well with others” rating during my year end evaluation.

Disclaimer: No poop holes were harmed during the relief of project constipation.

Relief example:

"I would like to help you meet that schedule of yours. I understand the control circuits need to be ready for that generator technician. I understand he won't be available for another month if we aren't ready by Tuesday," said the grizzled electrical construction foreman, "But that special SIS wire you asked for, that I told you we don't really need, well, it will take two weeks to get here."

"So, if you have the wire, you can get it done?" I asked.

Seeing where I was going, he replied, "Sure, and I know what you are thinking. Go ahead and try to make one of your Home Depot runs, but you will not find any of that wire."

I nodded and headed to my rental car.

The background is that we were making control modifications to switchgear, and the proper wire for that task is the SIS lead wire used by switchgear manufacturers. The foreman was correct that I would not find it at Home Depot. In fact, he was correct that I would not find it at any electrical supply house within 500 miles. That was why he was given instructions to order the cable a month before.

With me at the Maryland site infrequently, this was my first meeting with the foreman since instructions to order the cable. By telling me he had not ordered the cable at this late juncture, he was letting me know the work would be his way

or not at all. That, my friends, is how corporate constipation works.

Unknown to the foreman was that about ten miles down the road was a switchgear manufacturer with whom I had a great working relationship. They had a whole supply room full of SIS lead wire.

Within an hour, I was back at the foreman's desk requesting a couple guys to help get the wire out of my trunk. The 2500-foot spool of SIS was more than I could lift by myself.

"So, those circuits will be ready for me to inspect Monday?" I asked.

"Yes, sir," he replied.

And that, my friends, is how the corporate equivalent of a scalding enema works. Where the poop hole is entrenched and the solution less simple, it can get as messy as the results of the figurative enema.

In the mentioned case, the supervisor looked at me a bit differently afterward, and we had a great working relationship. Midway through an eight-hour outage to replace 13.8 kV gear in a substation and looking for anywhere to get off my feet, I sat on a four-foot stepladder to watch the progress. He took a picture of me in my pensive pose on the ladder. I wondered if he saw it as a picture of

exhaustion, I had already been there over eight hours after early morning preparation, or the lord ruling over his manner or an errant school child sent to the corner for a transgression.

He then told me, “One of his guys was going for Phillies, would I like one?”

I said, “Yes.”

He asked, “How would I like it?”

“The same way you like yours,” I replied.

That was the best Philly Cheesesteak I ever had, and I have spent time in Philadelphia.

All Cars Electric by 2035

Specific:	Stop selling fossil fueled vehicles by 2035
Measurable:	Yes
Achievable:	That is what we will talk about
Resource-Driven:	Maybe
Time-Based:	By 2035

Before fully electric vehicles were commercially available, I made plans to build one myself. I had experience with Adjustable Speed Drives (ASDs), which are the heart of modern induction motor driven electric vehicles. I knew a guy who might give me a factory return ASD with a failed front end. The front end of a drive turns Alternating Current (AC) into Direct Current (DC). Since the power source for the car project was DC output from batteries, no ASD front end was needed so lucky me. The drive would power an electric motor mounted, with a carefully crafted adapter pate, to the front of a rear-wheel-drive car's manual transmission. BMWs are rear wheel drive. Their engines are very expensive to replace. A ten to twenty-year-old BMW Five series with a blown engine is a very nice but relatively inexpensive starting point. Power sourced from twelve 12V trolling motor batteries provided 144V, which was within the DC source requirements for an ASD with 208V, three

phase output. A step-down converter provides for a separate 12V battery for the car's typical 12V accessories.

I figured $2,000 for the car hulk, $1,200 for the batteries, $500 for the custom motor mounting plate, free ASD, $500 for a used 20 HP motor from EBAY, and I would have an electric car for less than $5,000. It would have a top speed of around 40 MPH and a range of around 40 miles. That was perfect for my job at the time, that was three miles away on city streets. I would even have the range to take people out to lunch in my electric marvel. That is, if the people did not mind a car in Houston with no air conditioning because the BMW engine driven air conditioning would be gone with the engine. I also hoped my lunch guests would not laugh too much at my steering effort due to a power steering pump that also disappeared with the engine. Then, I took a new job that was fourteen miles away and required freeway travel. My plans for an electric car went on hold.

Before I put my, then state of the art, electric car plans on hold, my research stumbled into guys in California who were completing prototype work on an all-electric roadster. It had a top speed far beyond that needed on any freeway and a couple hundred-mile range. I was hoping they had developed an electrically driven air conditioner pump I could buy for my project, but that was not a priority for a California convertible. There was also no help for my power steering needs because the Lotus Elise, on which the roadster was based, did not have power steering because it was a

lightweight, rear engine car. That changed a bit with the extra weight of batteries, but the gear ratio of steering designed without power assist was still less effort than a BMW geared for assist. Shortly after my research ended, Elon Musk became a major investor in the car venture named after the father of AC, Nikola Tesla.

Fast forward to the 2012 Tesla Model S, which had both air conditioning and power steering. The $57,000 price was quite a bit more than my planned Franken-beemer but in line with a four-door luxury car. By 2015, this high-end vehicle was the bestselling plug-in car in the world, with sales exceeding the much less expensive Nissan Leaf. Owners enjoyed free roadside aid and free charging at Tesla superchargers. A 2017 Model S is now my daily driver.

That said, driving a wonderful vehicle like my Model S convinces me that cutting all fossil fuel vehicles has severe challenges. While I love my car's power, quietness, and lack of a tail pipe, I know calling it emissions free is a bit of a misnomer. I have just transferred 1.25 pounds of CO2 per kilo Watt Hour (kWH) from where I live to a coal plant down the road. Rather than each of the 100 kWH of energy stored in my battery producing 3.3 miles of my car's indicated range, power goes to the air conditioner or heater, the battery, and all the computers in my Model S. When I was on a trip out of town, my phone's Tesla app showed my car's range decreasing by ten miles per day while parked at home in my garage.

Speaking of range, when I bought my car with an EPA range of 330 miles, I expected to easily make quick 180-mile jaunts to Austin or San Antonio. Then I learned Tesla hides 10% of the range, like how fossil fuel vehicles still have fuel in the tank when the needle is on "E." To extend battery life, the recommended battery charge limit is 85% of capacity. That limit is based on the three hundred miles I can see rather than the 330-mile rating. Also, to extend battery life, it is recommended to limit battery drain to a level of 30% of battery capacity. The practical range is, therefore, 55% of 300 or 165 miles, fifteen short of either Austin or San Antonio. The range is less if you drive over sixty-five miles per hour or use the air conditioning. As a side note, not just for Tesla, I wonder about the number of vehicles that have benefited by inflated fuel mileage ratings because of tests done in Michigan, where air conditioning is not needed.

Another shortcoming is the lack of a spare tire. For some reason, the laser focus on fuel mileage and saving weight has made it okay to remove a feature standard on nearly every car built in the last 125 years. Oddly enough, GM, who ought to know more about building cars than a startup, also dropped the spare tire in their Bolt. Rather than being justified by the inclusion of run flat tires, Tesla is said not to need a spare tire because of free roadside aid. Ever cautious, I took the added precaution of buying a cigarette lighter powered compressor/tire sealant dispenser for my car. However, when I was driving on a Houston freeway, heard a thunk, and watched tire pressure plummet from 45 psi to

zero in a matter of seconds, I knew there was a hole far larger than could be handled by my measly battery powered compressor or its sealant. After a harrowing couple of minutes getting off the freeway during a busy Friday afternoon rush hour, which would have been the same with any car, I crept into a fast-food restaurant parking lot and called the Tesla roadside aid. While on hold, I went inside, ordered a soft drink, filled up my cup, put on the lid, and finished half the contents. If I had a spare, I could have changed it in the time I was on hold. The very pleasant Tesla representative returned to tell me the support vehicle would be there at around 4:00 PM on Monday.

A further irony, with my typical road travel being more than even the Tesla's full EPA published range, I knew when I bought it that it would be for in town driving only. The reason the around town limit was okay is because my earlier vehicle was a Toyota Avalon that was limited to in town driving. "Wait a minute!" Toyota pundits exclaim even without getting into the fuel reserve, an Avalon can easily go over 400 miles on the highway at seventy-five miles an hour while running the air conditioning.

However, the Toyota's issue was a P0015-engine code. What is a P0015-engine code, you ask?

A P0015-engine code most often shows a failing camshaft position sensor. It can also mean you just have low oil or as the Toyota mechanic told me, it is an indication on

V-6 engines built between 2008 and 2011 of an imminent failure due to a flawed cam lobe design. The estimate for replacing the flawed cam lobes on my car was $7,000. When the service manager showed me the estimate, I asked what the car was worth. He said a ten-year-old Avalon in as good a shape as mine was normally worth $5,000, but mine had a P0015-engine code, so it was worth $1,000 less. The logic of a $7,000 issue reducing the cost only by a thousand escaped me at the time. None the less, I concluded this was all a scam to get me to trade in a perfectly good car for a new Toyota.

I then made the mistake of asking what would happen if I did not do the suggested P0015-engine code repair. He said, "At some point, the engine would just lock up."

I thought about that for a moment and realized the car had an automatic transmission, which meant the car would coast rather than come to a screeching halt when the engine locked up. Cautiously, I took the car three miles to my home. For a while, I did not drive over 65 MPH. I left early for trips to the airport in case the engine locked up on the way. My plan was to then pull over and call an Uber to finish the trip. While a car with a P0015-engine code is supposed to run rough, the Avalon continued to purr like a kitten for three and a half years following the fatal diagnosis. Weeks before I traded the car in on the Tesla, I said to heck with the city driving limitation and took the Avalon on a trouble-free trip to San Antonio.

One precaution I had taken after the P0015-engine code diagnosis was to get AAA roadside assistance so that when the Avalon engine locked up on me on the way to the airport, I would just throw the keys under the floormat of the disabled car and let AAA get there whenever they chose to get there to tow what was basically a totaled vehicle to the nearest salvage yard. After my trade up, I thought with Tesla's free roadside aid, I could get rid of AAA. It was a good thing I did not. The AAA wrecker was there in an hour, and we took the Tesla to the parking lot of a Discount Tire Store that was closed by the time we got there. I felt a little concerned leaving my recently bought, high end vehicle sitting overnight in an unprotected parking lot. Nervously returning to the store first thing in the morning before they opened, I was happy to see my car was intact. I had to chuckle that there was another Tesla with a flat tire in the parking space beside my car.

Hopefully, when/if Tesla updates their cars, they will turn the frunk (small front trunk) into a place for a spare tire. Right now, the frunk will not hold even a mini spare. I have a feeling that just the mention of mini spares would ignite Elon Musk into a rage. I am just saying Volkswagen Beetles used to have a full-size spare in their frunk, but of course, Volkswagen tires were 13" P78s rather than the Tesla 19" P235s. Still, Tesla employs smart people. One of them surely could make the adjustments for a compact-ish spare and jack. I have seen examples available on eBay. I would

buy one, but it would need half my rear trunk, and that is where my golf clubs go.

Okay, so no spare tire. “Get over it!” I can hear Mr. Musk or former president Biden saying. (Funny that they would ever agree on anything.) A further complication of less than published range is an increased need for charging. If you want to drive outside the radius enabled by home charging, roadside charging is needed. Tesla’s supercharger network solved this, except, like the roadside aid, the charger quantities are based on a company selling 10,000 cars a year rather than close to a million. They are overtaxed, with less than 1% of vehicles being electric. A one-for one replacement of gas stations with EV chargers comes up short because refueling takes five minutes while recharging takes an hour. An hour, that is, if the charger is working. Nonfunctional chargers were one of the tales of woe a fellow Tesla owner related in their attempt to make a routine trip to Dallas, that is 240 miles away.

At this point I will pause to admit my focus on electric car range has to do with the fact that I live in Texas. There is an adage that in Texas, they think that one hundred years is a long time ago; in New England or Europe, they think that 100 miles is a long way. From my house I can drive 750 miles straight on I-10 and still be in Texas. On the east coast, starting in Virginia, 750 miles will let you hit ten of the original thirteen colonies, plus West Virginia and Maine. In Norway, which may be all electric now due to huge

incentives, there are few trips that would take more than one recharge stop.

From the Texas point of view, for practical cross country automotive travel, there are three options. You can choose the not so environmentally friendly choice of having a GMC Yukon in your garage beside your electric car, as is my case. Giving a little more consideration to the environment, you can do as one of my friends does and drive a fuel sipping turbo diesel powered German car. (Side note: this may no longer be a choice because the availability of new German turbo diesels in the United States seems to have ended after the Volkswagen turbo diesel fiasco.) Lastly, you can take my son's choice and drive a hybrid SUV with highway mileage in the 45 MPG range.

Doesn't the hybrid's 45 MPG pale beside the Tesla's over of over 100 MPG. Yes, if you do a straight 33.7 kWH per gallon of gasoline conversion. However, to turn fossil fuel into electricity, you must burn it as fuel in a generator that has an efficiency between 25% and 50%. Fortunately, most utility generation efficiency is on the higher side, and with renewable energy thrown in, the overall efficiency is about 45%. My Tesla's actual CO2 burden on the environment is the EPA rating of 111 MPG multiplied by 40% which is 50 MPG. So, ha! I still beat my son's rascally hybrid, except did we mention that my son was driving at 80 and running his air conditioner. In that case, the Tesla equivalent drops to around 42 MPG. That still beats my

Yukon's, very good for a ginormous SUV, 20 MPG, but with three hours of fueling stops versus zero for the Yukon or my son's hybrid on a 500-mile trip, I am not taking the Tesla on any long trips any time soon.

All that said, I believe electric cars are one of the options that can lead to a greener future, not just the only choice. I fully expect a huge shift in air quality for cities like Beijing as electric cars and scooters take over short range intercity duties. Unlike Elon Musk, who detests hybrids as a compromise, I want to see a focus on hybrid applications. The first is for big trucks.

The motor in my Tesla has more power than most big rigs. A couple slightly beefed-up versions of that motor in place of the two rear differentials and axels on an 18-wheeler takes us a long way toward a practical truck. A start on the required batteries is replacing the two 100-gallon fuel tanks on the truck and then add a generator just big enough to match consumption on level highways. This produces a boost in big truck efficiency that might be equivalent to the difference between my Yukon and my son's hybrid.

As with other comparisons, it is about more than better efficiency for the trucks. An oft-overlooked advantage of electric vehicles is regenerative braking. This is a huge advantage for cruise control. Driving my Yukon down a mountain pass, I must hit the brakes as my 65 HPH setting quickly becomes 80 MPH or more on the downhill run. In

the same situation the Tesla's regenerative braking ensures my speed sticks like glue to wherever I set it. As opposed to brakes that heat up and fade with use, regenerative braking can run all day long, or at least till the battery is charged, without issue. Runaway trucks in the mountains could be a thing of the past.

Aside from my hybrid big rig fantasy, I hope that as the first generation of electric big rigs hits the roads, one of their first regular routes is the daily round trips from Denver, Colorado, to Summit County. The electric motors with no derating for higher altitudes can cruise easily up the slopes to the mountain locations. With a sufficiently depleted battery, the trucks could regenerative brake for the trip home to arrive with more charge than when they left the top of the mountain. Those living along I-70 would much appreciate the elimination of the blat, blat, blat, blat from engine braking.

95% Utilization Rate

Specific:	95%
Measurable:	Yes
Achievable:	In theory
Resource-Driven:	People are resources
Time-Based:	Evaluated per quarter

For law firms, accounting firms, and engineering consultants, the companies make money based on employee hours entered on time sheets. The ratio of time entered versus time charged to clients is a utilization rate. Employee evaluations include their utilization rate with vacation hours one of the challenges. Two weeks' vacation drops the utilization rate to 96% if each of the employee's other weeks is fully chargeable. 8 holidays reduce utilization to a max of 93%. Vacation increases the longer employees stay with companies. With four weeks' vacation, utilization is under 90%. Ageism aside, older employees with six weeks' vacation might be made redundant because of their inability to meet utilization goals.

Lower-level employees' options for impacting their utilization rate are working slowly or making false timesheet entries. Utilization rates should, therefore be only manager goals. The first person let go when utilization rates fall

should be a senior VP so we can get someone in that position who will get work in the office.

84 Hours Per Week

Specific: Work 84 Hours per Week

Measurable: Yes

Achievable: It's only half of every day

Resource-Driven: Gets the most out of employees

Time-Based: Per Week

When I talk about my favorite job, I clarify that I worked in Engineering and Construction. Rather than coming into the same office every day and working for the same great boss for years, doing a job I loved, each assignment was a brand-new job. Bosses were good and others not so good. Jobs were challenging and invigorating and others not so much.

People are surprised or think I am crazy when I say my favorite assignment was the summer. I worked 84 hours per week. Added to those 84 hours was a half hour each day for lunch and an hour commute each way for a total of fourteen and a half hours each day. My days were work, shower, eat, sleep, shower, eat and back to work. It could have gained a half hour by skipping one of the showers, but there was no way my wife was going to let me take petro-chem grime to bed with me, and I needed a morning shower to get going.

I thought I could still have a life as exampled by going straight from the site to a two-hour choir practice. When the altos finished practicing their part, a fellow bass had to wake me when it was our section's turn. I got a stern look from the choir director when I was startled and almost fell out of my chair. During the summer of fourteen-hour days, I may have gone out with my wife to see the beginning and end of movies. She would nudge me if I started snoring.

How could work, work, work, and no life be someone's idea of their favorite project ever? The project was a restoration of a gas storage facility after a fire destroyed the facility's power and control wiring. The facility outage was costing the owner a million dollars a day. If you are smart and you want to get something done quickly, the first thing you do is throw bureaucracy out the window, which they did on this project. Getting rid of bureaucracy goes a long way toward making work enjoyable.

Any requested equipment, material, or manpower needs were met. The manpower part is how I was pulled from my normal office and sent to the site in the second wave of "as many bodies as possible." I did not even have a place to sit. As a professional engineer there to make all the nonprofessionals' work legal, my bosses back at the office would have been happy if I had spent my time drinking coffee while answering a few questions and signing 84-hour-a-week timesheets.

However, I get bored easily, so I started looking around for something to do. My search took me to the engineering manager's office just as he was about to give up on finding someone to take charge of the replacement of the thousands of wires connected to the site's central control system. This crusty old construction hand did not expect anything from me because, in his experience, engineers from the office often did not know what a wire looked like. He did not know I had been a maintenance electrician when I was a co-op. Figuring out wiring problems was my bread and butter. It is always fun to exceed expectations, especially when they are low.

I took drawings to the field to mark them up for reconnection, only to learn why no one else wanted the control wiring job. The site had gone through control iterations. Pneumatic had been replaced by standalone electronics. Individual equipment was replaced by programmable controllers for sections of the plant. Distributed controllers further centralized control. With each iteration, the replaced equipment's enclosure became a junction box, translate, birds' nest, for connection of the new more centralized controller. Some birds' nests were documented, and some were not. Wires would backtrack to what was once a remote-control room and then go to the site's primary control room. It was miles and miles of a great big wire puzzle. I like puzzles.

After days of unscrambling birds' nests and removing backtracks, I returned to the trailer with an arm full of marked-up drawings. Procedure was I would hand these to a designer to do the CADD modifications, but the designers were all busy achieving their own goals. Engineers are not supposed to do CADD because their hourly rate is too high. Given that I had to sit and do nothing while waiting for CADD work completion, I disagreed with that edict. In a time of desperation on an earlier job I had learned a few commands. In the print room I found a chair at the printer server computer that was loaded with CADD. I updated and plotted the first group of drawings and handed them over to construction. A compliment from the site manager felt good when the first step in the restoration of the central control system finished ahead of schedule.

For the next ten weeks or so, I developed a routine; before the south Texas summer got too hot, I headed out to a salt dome well head to document what was not there anymore or what was new. I then walked the shortest route to central control and returned to the engineering trailer to update site layouts, junction box drawings, and material lists. At times there were electricians standing behind me waiting for a completed drawing so they could take it to the field to do the installation. Talk about instant gratification.

Another time, I was at my computer in the print room when a client engineer, that I worked with daily, asked me if I could update a drawing. The client manager waiting for a

printout happened to overhear and asked, “Why are you asking that engineer to update a drawing? Does he even know CADD?”

“I think he only knows five commands,” was the answer, “but he knows those commands very well.”

At the site, there was a trailer full of CADD operators, and me in the printer room doing drawing updates. Over the summer, a total of 478 drawings were updated. 268 of those were my work. In other’s defense, they did complicated drawings. I did simple drawings.

The 84-hour weeks only lasted 8 weeks. Engineering cut back to 60-hour weeks, only ten hours a day, and we got Sunday off. Except one Sunday, they came to our site manager and told him they wanted me to work Sunday with the client engineers. They only wanted me and no one else. It was a nice compliment, but I had really been looking forward to playing for my softball team for the first time that summer. I told the client engineer and, of course, got the “Really, you are putting a silly softball game ahead of resolving a million dollar a day outage” look. That said, together, we took a closer look at what we needed to be ready for Monday and realized we could be finished in plenty of time to get me to my softball game. In the end, the client team was also happy to get home earlier. People who are flexible and only push when pushing is necessary make good jobs, great jobs.

Something that was pleasant for all our project team was the extra money. The hourly designers were making time and a half for everything over 40 hours. As a salaried engineer, my pay was my regular hourly rate, but with paychecks that were 110% over normal, I was able to pay cash for a new car at the end of the summer. I think people in management got a bonus for the plant's early return to operation. I got a jacket. Paid overtime or a big bonus can make long hours enjoyable.

Rather than 84 hours per week being the goal for that project, if it had a SMART goal, it was:

Specific:	Return fire damaged plant to operation
Measurable:	Plant operation
Achievable:	If we cut bureaucracy and do not worry about the budget
Resource-Driven:	If we do not worry about the budget, we can get the resources
Time-Based:	By the end of August

On the other hand, the 84-hour week goal I am referring to in the heading of this chapter was an edict by Elon Musk for the employees of Twitter. I have read a Musk biography and understand a little of where he is coming from. For his first company, his office was his home. Given that he never

left the office other than to get food or take a shower at the YMCA, twelve hours is a short estimate for his workday. Musk's long days continued when he moved on to start up Space X and Tesla, which were driving toward critical goals at the same time. Many days could have been the day that bankrupted either or both companies.

For those, he may have written two challenging SMART goals:

Design, Build and Launch a Rocket for Commercial Applications, with the first Launch in 2008

Specific:	Launch a rocket
Measurable:	Rocket success
Achievable:	Wow, not many thought so, but they were proved wrong
Resource-Driven:	Before all the money runs out.
Time-Based:	In 2008

For the Tesla, Design and Sell an Advanced All Electric Sedan by 2012

Specific:	Build and sell an advanced all-electric sedan
Measurable:	Sales goals were part of the goal

Achievable:	Again, wow, not many thought so, but they were proved wrong
Resource-Driven:	Done with available funds
Time-Based:	In 2012

To reach goals, Musk worked long hours and expected all his employees to work those hours with him. As an engineer, it would have been cool if my 84-hour work weeks had focused on a rocket or the first practical electric car. At the same time, knowing what 84-hour weeks are like and what they do for your personal life, working for Elon Musk for the duration of either of the projects would have put an end to my marriage. Musk himself has been through two wives and, I believe, has now settled on the reality of a string of rotating girlfriends.

Musk proudly says that he has not taken a vacation in years, but when you own a private jet and travel all over the world for business, you get to spend time in incredible places. That is much like what anyone else would have to spend time and money on for their vacations. A billionaire with a private jet does not have to spend a week driving to get to the Grand Canyon and back, but hourly workers do.

Also, when we make demands of others, we must understand they are simply wired differently. I was envious when a co-worker said he only needs five hours of sleep per night. I trust what he says because I never saw him heavy-

eyed in a meeting. He is a successful and popular manager, but with an understanding that people are different, he would never base the sleep needs of employees on his own.

84-hour weeks can work for limited periods of time when energized by an exciting target. As a plan for conducting daily office business, the first question about the long hours is, what are people supposed to be doing? Anytime hours alone are a goal, a common solution is being as unproductive as possible.

Common goals that reward unproductivity:

- 84-hour work weeks without a specific goal
- Judging by who is the last one to leave the office at night
- Worker utilization rates
- Judging people by whether they take vacation

Zero Change Orders on Four-Year Project

Specific:	Zero Change Orders
Measurable:	Anything more than zero
Achievable:	Oh, be real
Resource-Driven:	No change orders save resources
Time-Based:	Four Years

We like to know what we will pay before we start. Fixed priced projects, otherwise known as “hard money jobs,” were what industrial customers wanted. Contractors were not afraid of fixed prices because, for a fixed price, the job must be fixed. Modifications produced change orders for which the contractors charged outrageous prices for the littlest of things. Profits well over expectations were the norm for fixed-price jobs.

Then customers got smarter, the estimators better and their specifications tighter. After contractors lost their assets on hard money jobs in the eighties, it became harder and harder to get a fixed price. The new standard was that any fixed price was an honest estimate plus 30%. In hopes that their tighter specifications would result in a project completed with the time and materials of the honest estimate,

the time and material jobs became the preferred path over the cost plus 30% hard money jobs.

Time and material jobs technically have no change orders because everything is based upon agreed-upon rates for time put in to do the work and the materials needed to complete the project. However, in today's bonus-based world, the bonuses are based on completion of a specific scope by a specific time. Can we say SMART goals, boys and girls? After quickly losing bonuses because of failure to meet goals, contractors introduced a change order that is not a change order but a "trend" that says a target is predicted to move and, therefore, becomes a new goal.

Instead of changing the building color from red to blue being just a change of building color. A trend covers the added scope of changing the building color in all the documents. It is work with people paid for changing the color in all the documents, but that happens automatically on a time and material job. What does not happen where goals and bonuses are involved is the adjustment of targets. Trends are produced, and the completion of the trends becomes as big a part of as doing work. The multi-page trend document describing changing red to blue could easily require more time and effort than the actual act of changing red to blue.

Beyond the silliness of the work documentation being more effort than the actual work, fear of trends can dissuade changes that might be important – As an example: this

building would be less likely to fall if we used 10” beams rather than 8” beams, but I just do not want to go through the effort of a trend.

Provide the Emperor with New Clothes

Specific:	New Clothes
Measurable:	Yes
Achievable:	Yes
Resource-Driven:	Fabric is needed, or is it?
Time-Based:	In two weeks

When we refer to the story of The Emperor's New Clothes it is generally the version by author Hans Christian Anderson. However, it is based on a medieval Spanish tale with versions in various languages noted as far back as the eleventh century. Included are cautionary lessons starting with the emperor with the grandest clothes in all the land, feeling the need for something even better. Lack of happiness with what we have is often the start of tales of woe. The counterpoint from the emperor is that if we simply accept things as they are, we never move forward. We will always have the challenge of the serenity prayer; Lord, let me accept the things I cannot change; change the things I cannot accept and have the wisdom to know the difference.

With change requiring alternatives to proven sources, the emperor sought outside candidates. The king ignored input from those with earlier royal clothing experience. After an

interview with a couple charming candidates, the king chose the new royal clothiers.

Certain he has chosen the best tailors in the world, the king proceeds to do everything in his power to confirm the wisdom of his choice. Gold was supplied for the special thread. When the emperor must believe in fine, invisible fabric, he goes along to further prove his choice of tailors was correct. In the fable, it is the tailors who suggest to the king that the fabric is only visible to those who are worthy of their position.

Others in the court used to the king's insistence on always being right, went along with the beautiful invisible clothes. Those outside the court, who were afraid of losing supply contracts, also agreed to the beauty of the king's clothes. It is a small child who has nothing to lose who speaks up and says the king is naked.

At this point, in other renditions of the story, the king turns red with embarrassment and tries to cover himself as he runs back to the castle in shame. In the original Hans Christian Anderson version, the king is the egotistical upper manager that we all know and love. He continues to walk confidently down the street, insisting that he is wearing the most beautiful clothes ever produced while everyone else is unworthy of their position.

That is where Han's story ends without mentioning that everyone else who valued their job continued to go along

with the king’s story or that the poor little kid was probably taken home and spanked by his parents.

10,000 Keystrokes Per Day

Specific:	10,000 Keystrokes
Measurable:	Yes
Achievable:	Yes
Resource-Driven:	Assuming you have a keyboard
Time-Based:	Per Day

As technology moves forward, procedures align with the technologies. Documents with clear, uniform type were once reserved for published works with pages meticulously assembled and then run through a printing press. In the early 1870s, the inventors of the QWERTY keyboard (with keys arranged as we see them on our computers today) made an agreement with the Remington Company, which began large-scale production of a typewriter in 1873. On these early devices, the typist could not see the characters as typed. This challenge remained until 1897, when John T. Underwood developed a typing area that made keys visible when struck.

Suppositions abound about the QWERTY arrangement. Was it designed to slow typists down? Evidence shows it kept much-used keys from interfering with each other in original manual typewriters. A theory says the intent was to alternate usage by right and left hands, but thousands of

English words are typed using only the left hand. This gives a typing advantage to those who are left-handed. German keyboards move the “Z” because it works better with the structure of that language.

From the dawn of typewriting, there were studies of typing speed and efficiency. Studies showed that people who type all the time are better and faster typists than those who type intermittently. In large companies, typing pools emerged. Industrial engineers set up monitoring to count pages or even listen for keystrokes to enable evaluation. In cases where pages were counted, jockeying was done to work for the group that wrote the shortest form letters.

When computers came along, it was technologically possible to count every stroke of the keyboard. Companies indeed counted every keystroke for employees whose production was keyboard-based. As mentioned, however, as technology moves forward, it is addressed. In response to the counted keystrokes, employees left a key pinned down during lunch to create thousands of keystrokes without creating the first bit of work.

Related to keystrokes that produce no work, I was surprised early in my career to learn that the debugged software output of the typical programmer was something like four lines of code a day. A reason for my surprise was, though I was a field service tech rather than a programmer, I could create very useful programs of a hundred lines or so

in a day. This led to people coming to me for help when the programmers said something simple would take two weeks. It then led to programmers making sure things were broken in the field, so I didn't have time in the office to program.

This being ancient history, it was a time when micro-controller chips were evolving such that it was hard to complete a job before the chips in the device were obsolete. With this the norm, a programmer I worked with at two companies over a five-year period never successfully completed a project in five years. An irony is that at the second company, I wanted to work in the office rather than field service and applied to the programming group. However, because my experience was only a week here and a week there to complete tasks, I did not have the five-years of continuous experience of the other guy. I was therefore considered unqualified to be a programmer.

Circling back to keystrokes, with remote work a new norm, spreadsheet watching managers have downloaded new apps that track the keyboard and mouse activity of remote employees. A counter app downloaded by employees simulates mouse movement and keyboard strikes. Where employers have blocked download of apps to employee computers, on-line, but not downloaded games or vacation planning keeps those mice moving and keyboards clacking.

Produce Pilots in a Reduced Amount of Time

Specific:	Specified Pilot Quotas
Measurable:	Yes
Achievable:	Yes
Resource-Driven:	Training facilities, available qualified candidates
Time-Based:	Yearly

On January 15, 2009, at the controls of US Airways flight 1549 was Chesley Sullenberger. “Sully” had been flying since he was in high school where he first learned how to deal with emergency situations. He started flying unpowered gliders during his time at the Air Force Academy. Certifications included those for flight instruction for both powered airplanes and gliders. He was an investigator of earlier accidents and had studied the psychology of airline crews during a crisis. Between military, commercial, and private activities, he had over 20,000 hours of flying experience.

When bird strikes disabled both engines of his plane on that fateful January day, Sully first started the Auxiliary Power Unit (APU) to ensure his instruments and controls would run. With the help of air traffic control, he evaluated

options for airports on which to make an emergency landing. With his glider training telling him his rate of descent precluded any of the airport options, he chose to put the plane down in the Hudson River. There was no loss of life largely because Flight 1549 had an experienced pilot who remained calm under the pressure of major equipment failures.

Short months later, 32-year-old Pierre-Cedric Bonin was at the controls of Air France Flight 447. Described as a "Company Baby," he was there in relief of an experienced captain, who, as is standard procedure on long flights, was taking a break in the plane's rest cabin. The plane hit turbulence and then icing conditions. The pitot tube used to measure plane speed iced over. Without speed information, the autopilot disengaged. While having to deal with multiple settings suddenly released by the autopilot, Bonin's input to the flight yoke resulted in a roll to the left and then right, followed by a steep climb. This resulted in a stall, which caused the plane to begin falling. To keep altitude, Bonin pulled the nose up rather than pushing it down to address the stall. His last words recorded on the black box were, "We're going to Crash! This can't be true. But that's what's happening?"

Between these two incidents, Colgan Air Flight 3407 cleared for an instrument landing system approach into Buffalo, New York. Captain Marvin Renslow had just over 3,000 total flight hours. Having been with the airline for just

over three years and with a typical pilot averaging about 1,000 hours per year, most of his flying had been with the airline. 111 hours of time, as a captain implies, he had been in that position for less than two months. First Officer Rebecca Shaw had recently celebrated her one-year anniversary with the airline. She had just over 2,200 total flight hours and less than eight hundred hours in turbine aircraft. With a salary of $16,000 per year, she could have been making more money working full-time at a fast-food restaurant, but this was hopefully a stepping stone to a major airline.

With modern planes, autopilot is engaged except for takeoff and before landing. That is, unless there are abnormal conditions, such as the possible ice buildup on Flight 3407. With limited time as captain, this could have easily been Marvin Renslow's first time in an abnormal situation. The ice buildup resulted in more altitude and speed loss than expected. The flight recorder showed flap settings different than expected. Response to a stall warning was pulling back on the yoke rather than pushing forward. My, does that sound familiar? The first officer did not help when she raised the flaps without saying anything just before they hit a house with the loss of all aboard in addition to one person in the house.

A 1994 National Transportation Safety Board (N.T.S.B.) review of thirty-seven major accidents between 1978 and 1990 showed nothing had failed; the crew had simply

neglected to properly watch the controls. Advances in cockpit automation have decreased the perceived importance of pilots. For those few moments when we need an attentive, qualified pilot, goals of producing pilots quickly and reducing their pay can mean the wrong person is at the controls when they are desperately needed.

Shut One Window Before Class

Specific:	One Window
Measurable:	Yes
Achievable:	Yes
Resource-Driven:	You just need to get out of your seat and shut a window
Time-Based:	Before Class

It was late February of my senior year in high school. We were about 5 minutes into the break between classes. Most people were waiting for our advanced math teacher to arrive. Then, someone cut what was the nastiest fart in the history of humanity. I do not recall ever identifying the culprit.

With eyes watering, people rushed to fling open the large casement windows of the 60-year-old, soon-to-be-demolished school. It is suspected that the source of the problem pitched in with a window opening to deflect suspicions.

On that winter morning, people near the windows were soon freezing and promptly closed the window nearest to themselves. This left one window, farthest from any student but right next to the teacher’s desk, open.

The students were in their seats, and the horrible smell abated when our teacher arrived. A woman near the age of our mothers, she had a son a year ahead of us; this sweet, trim lady with a Jackie Kenedy bouffant bob sprinted across the room in a pencil skirt while emitting a low growl like that of a wolf gently signally its presence before devouring you.

We were surprised and a little scared by the strength exhibited when she slammed that last window home. We winced at the expected tinkle of broken glass, which did not come. She spun around and, in a fury, let us know just how not funny she thought it was for us to try to freeze her. She immediately announced a pop quiz that contained a single problem that none of us could solve lowered the semester grade of everyone in the class by a point. When we returned to class the next day, the ropes to the sash weights on that window were cut so it could never be left open again.

Simple misunderstandings can produce significant impacts. Before taking offense at something that may have been just a slip, we need to take a breath. If the teacher had just asked, “Why is that window open?” Someone would have jumped up to close it. In this case, if only to avoid having to explain any part of what led that window to be open. On the other hand, if we see something, get up and close that last window before that pop quiz.

Commission Solar CO2 to Methane Converter in 18 Months

Specific:	Commission
Measurable:	Yes
Achievable:	Yes
Resource-Driven:	Needs support of great ideas group
Time-Based:	18 months

In mid-summer, the site's big boss came into my cubicle while I was eating lunch and reading a book. He said corporate wanted innovative ideas for a possible TEDX Amsterdam presentation. As a research group, upper management expected that we would have something.

As luck would have it, an internet blurb on artificial photosynthesis caught my eye earlier that day, and I was reading *Life of PI,* in which inflatable solar stills play a role. Rather than true photosynthesis that creates carbohydrates, the article I read described titania nanotube catalysts that used solar energy to turn CO2 and water into the hydrocarbon methane. I proposed a combination of the floating still and nanotubes to create an inflatable converter, pressurized by CO2-rich engine exhaust, which converted CO2 to methane.

My idea was chosen as one of the top five in the world which meant I got to fly to Amsterdam to present against four others for the open spot at TEDX Amsterdam. People told me they thought my idea was the best, but as the judges viewed the presentations, they noticed people who did not have Dutch accents and realized the request for submissions had mistakenly gone worldwide. The choice for TEDX was a Dutch proposal that used helium balloons to lift water to the stratosphere to make ice.

While entertaining, the stratospheric ice did not move forward for evaluation by the company's great ideas team. My suggestion was selected for consideration. With the PHD developer of the Titania nanotube catalyst, I presented to a very opinionated board. Each came with a bullet loaded in their gun to shoot down my idea. Could it compete with wind energy in terms of total energy production? It looked like its energy production did not match the best solar projects, with efficiencies approaching 30%. Could the process produce liquid hydrocarbons that were the preferred feedstock for chemical production facilities?

The brilliant PHD inventor of the titania nanotubes, who coincidentally taught at a local university, explained that the goal was economic small-scale projects that produced energy and removed CO2. Rather than competing with the efficiencies of the more exotic and yet unproven solar proposals, the goal was to match the efficiency of available photo voltaic panels. The advantage is that CO2 is removed,

and the fuel produced can be stored for use at night when solar production is offline. The intended use is as generator fuel rather than as feedstock for chemical production. Just like that, the PHD countered every bullet fired at him.

The PHD stated he had proven the concept on a small scale. Next was to engage identified manufacturers who can create larger-scale sheets of the Titania nanotube catalyst. Panels would incorporate the sheets with the solar stills for water vapor and generator exhaust providing CO2. We visualized the first test using five hundred square meters of panels at a sewage treatment facility that has the existing ability to use sewer gas as fuel. The thought was that the output of the panels combined with the sewer gas would fuel the existing generator that sources the CO2 for the panels. Only minimal CO2 is recovered in the process, but that is CO2 that does not remain in the atmosphere.

“That is not much,” the group responded as one.

The PHD continued with the thought that every little bit helps, and from the tiny sewage treatment projects, we envision large-scale installations at places like the LNG plant in Chili that is near the ocean in a desert with plenty of sun and available land. There, capturing megatons of CO2 is possible, but we need small, practical steps to prove the concept. The sewer gas collection site provides the ideal location for the installation of the larger-scale panels produced by a vendor that has already been located.

I think we have heard enough said the chair. The selection team seemed to have not heard a word as each panel member repeated the statement that they used to start the meeting:

“No, I don’t think it can compete with wind energy in terms of total energy production,” said the first evaluator.

“No, its energy production does not look like it will match the best solar projects with efficiencies approaching 30%,” said the second.

“No, it doesn’t look like it will produce the liquid hydrocarbons that are valuable as feedstock for chemical plants,” said the third.

The PHD left in frustration and totaled his car, driving back to his university office.

The project sponsor, listening from Amsterdam, was not pleased with the result. He negotiated to give a grant to the PHD despite the review board's direction. As a concession, rather than me executing the 18-month plan for a sewage treatment plant demonstration, the guy who thought it had to produce liquids was in charge. After 18 months, there was no progress with a focus on the proper amount of water and energy required at the panel output to turn methane gas into a liquid hydrocarbon.

If you like the idea of solar CO2 to methane conversion, contact Oommen Varghese, PhD at the University of Houston. He is one of the most intelligent people that I have had the pleasure to meet.

All Cub Scouts Den Members Advance Rank by End of Year

Specific:	All den members
Measurable:	Yes
Achievable:	Yes
Resource-Driven:	Den mothers to provide
Time-Based:	End of year

Somehow, I got through Cub Scouts in the sixties without spreadsheets or Microsoft Outlook notifications. There were checkboxes in my handbook, but instead of sending me pie charts with progress expectations, my den mother and parents sat down with me to read the handbook. They got to know me along with my strengths and weaknesses. I received help instead of notices that I was underperforming.

I recently looked up goals for Cub Scouts and found:

- Work towards earning your badges and awards.
- Participate in community service projects and help others.
- Learn new skills, such as camping, hiking, and cooking.
- Make new friends and develop social skills.

- Practice good citizenship by respecting others and being responsible.

There is no mention of fun.

Sell 200,000 Ugly Cars with a Strange Name in 1958

Specific:	Sell Edsels
Measurable:	Absolutely
Achievable:	The marketing survey says it is
Resource-Driven:	The upscale appeal will justify the added cost
Time-Based:	September 1957 through September 1958

Sell 200,000 ugly cars with a strange name in 1958. Put that way, it is easy to understand why the Edsel struggled. The Edsel, now a term synonymous with failure, was a car introduced in 1958 by the Ford Motor Company. Rather than being a Ford Edsel, Edsel was a separate marque like the General Motors Pontiac division. The fact that Edsel was a marque rather than an actual division contributed to the poor build quality that further hamstrung sales. For an Edsel, a chassis was inserted in the Ford assembly line. People who could build Fords in their sleep had to realize this was an Edsel, grab parts from an Edsel bin rather than a Ford bin, and install that part correctly on the Edsel. Some parts they were not sure about were thrown in the trunk to be installed by Edsel mechanics at the dealership. Imagine what the quality control guys would say about a vehicle with parts in

the trunk awaiting installation. “Oh, it’s an Edsel; send it to the dealer.”

As is common in cases of product failure, Edsel began with a marketing survey. I wonder if those who think marketing surveys are good have ever participated in a marketing survey?

Marketer, “Sir, would you mind answering a few questions for a marketing survey?”

Me, unsaid, “Yes, but if I say that, you will make me feel like a jerk. Instead, I will give you answers that you will someday regret having asked.”

Me, said, “No, I don’t mind.”

Marketer, “Would you buy a big ugly car with a weird name.”

Me, “Sure.”

Marketer, after more annoying questions, “Thank you for your time.”

Me, “You’re welcome.”

While purported to have a style all its own, the Edsel, in fact, shared components with base model Fords. This enabled insertion on standard Ford assembly lines, which created the afore mentioned quality issues, but looking like

all other Fords did not justify the Edsel's premium price. On one notable count, they did have a unique look in the form of a vertical grill that looked like an Oldsmobile sucking a lemon.

Features on the Edsel were more like gimmicks and often detrimental to the actual driving experience. Buttons on the automatic transmission control had to be pushed in a specific sequence, as in drive, neutral, reverse and then park to go from drive to park. The location in the middle of the steering wheel led to the shifting of the transmission when the intent was honking the horn. A column shifter replaced this awkward feature for the 1959 model. This further eroded the differentiation between Edsels and Fords causing a further drop in already poor sales. Two months into the 1960 model year, after less than three thousand units, the Edsel was discontinued.

The people responsible for the Edsel tried to blame the failure on the fact that it debuted as a premium car at a time of economic downturn. It was just the wrong car at the wrong time. Echoing our earlier discussion of dumb bombs, executives said, "The aim was right, but the target moved."

Hold Design Team to 40 Hours Per Week

Specific:	40 hours
Measurable:	Yes
Achievable:	In theory
Resource-Driven:	Reduce the spending for labor
Time-Based:	Per week

A constant for engineering projects is that each one begins with a management edict that workers are limited to 40 hours per week. In a world where megalomaniacs are demanding 84-hour work weeks from employees, this sounds like a good thing, except the 84 hours is at 40 hours pay, and hourly workers on engineering projects get time and a half overtime.

The heart of petrochemical jobs is piping designers or "pipers," as they are known in the business. As an engineer, pipers impressed me. Though most had only a high school education, they had boats and second homes that I could not afford. Yes, their hourly rate was less than mine, but they received time and a half overtime. The basis for the loans on the boats and second homes was sixty-hour work weeks.

Not long after projects started with 40-hour-per-week limits, schedules slipped. Kicking and screaming would

come from the direction of whoever made the 40-hour edict. Sometimes, this results in replacements among project management. Pipers just shrugged. The project schedule failings reach a breaking point. The piping designer's weekly work weeks increase to sixty hours. Magically, project goals are met.

Launch Space Shuttle at 9:38 on January 28, 1986

Specific:	Launch Shuttle
Measurable:	Yes, but maybe you want to say launch and return safely
Achievable:	Been done 24 times before
Resource-Driven:	Every day on hold costs money
Time-Based:	9:38 on January 28, 1986

The space shuttle was a reusable spacecraft that flew for the first time in 1981. At launch, it includes an external fuel tank and two solid rocket boosters. The boosters have sections with O-rings as seals for each joint. For each section, there were two O-rings that downgraded their safety classification from 1R, where failure could result in loss of life, to that of a redundant system.

The twenty-fifth space shuttle flight and tenth for the shuttle *Challenger* was scheduled to launch the morning of January 28,1986. The temperature prediction was for a record low for a space shuttle launch. Engineers from the O-ring manufacturer, Morton Thiokol, had concerns about the impact of low temperatures on the O-rings. On the evening of January 27, there was a conference with NASA. Three upper-level Morton Thiokol employees recommended

against the launch. There was a break in the call for Morton Thiokol to discuss amongst themselves. When the call resumed, there were no concerns.

The NASA project manager called the NASA mission management team to discuss the launch weather but did not mention the O-ring discussion. A two-hour delay was provided to give ice on the launch tower a chance to melt so it would not fall off and damage the shuttle, boosters, or fuel tank.

The launch at 11:38 would still achieve the goal of having the shuttle in orbit and ready for a live conversation with President Reagan during his State of the Union address that evening. Seventy-three seconds into the flight, the *Challenger* exploded with the loss of all seven crew members. The president canceled the State of the Union address and instead spoke to the nation about the disaster. It is a shame he could not have moved the State of the Union to let temperatures warm up for a safe launch.

There was endless speculation about what was said at Morton Thiokol during the break in their conference call with NASA. For future similar situations, heed should be paid to accident team investigator Richard Feynman, who said:

"For a successful technology, reality must take precedence over public relations, for Nature cannot be fooled."

Restart Plant on March 23, 2005

Specific:	Restart Plant
Measurable:	Yes
Achievable:	Yes
Resource-Driven:	We need to start making money again
Time-Based:	March 23, 2005

A wink and nod bypass procedures when those procedures get in the way of achieving goals. At the BP Texas City refinery, they were anxious to restart production after work on the raffinate splitter, which was a 170-foot tower that was part of the isomerization process. The plant was built in 1934. Little if any maintenance was performed since. The tower had shortcomings like out-of-calibration level meters and glazed-over site glasses.

Seat of the pants control by experienced operators overcame issues. They knew what the level was by how long it had been since they opened the fill valve.

With knowledge of shortcomings in the Pre-Startup Safety Review (PSSR), the startup began on the management-free night shift with the thought that happy managers would hand wave the paperwork when they saw

the unit was back in operation. The day supervisor was late for work and did not have a hand-over from the night operator. Another day supervisor was told storage tanks were nearly full and the start-up should not continue, but he did not pass this on. Level control valves that were supposed to be automatic were in manual mode.

The inaccurate transmitter and the site glass were supposed to confirm that tower fluid levels were less than nine feet. In fact, levels were at 158 feet. Other valve mis-operations resulted in a 20-foot geyser of hot hydrocarbons. A diesel pick-up truck left idling twenty-five feet away from the geyser took fumes into its air intake and began to race. A backfire from the truck ignited a vapor cloud, triggering a massive explosion heard for miles.

Not so far away, in fact, only feet away, were contractor trailers set up for convenient access that avoided long walks to the turn-around work area. Several of the trailers were destroyed, with fifteen people killed and 180 severely injured. Industry safety regulations changed as a direct result of the Texas City event, including restrictions on the siting of contractor trailers.

It was over two years before the isomerization unit was back online.

End Gas Compressor Station Emissions by 2030

Specific:	Eliminate Gas Compressor Station Emissions
Measurable:	Yes, all gone
Achievable:	Yes
Resource-Driven:	A bit of a resource burden
Time-Based:	2030

There is no such thing as a zero-emissions motor. Electric motors just redirect their emissions to someone else's smokestack. Replacing fossil fuel engines with electric motors can be strategic to redirect emissions from a congested city of over four million to a thinly populated rural setting. However, emission-shifting ramifications can leave us in a lurch.

Where the transfer of emissions to other stacks might affect us in Texas is the replacement of combustion engine gas pipeline compressors with electric compressors. During my career as an electrical engineer, the suggested replacement of gas-driven compressors with electric compressors has come across my desk multiple times over the past 35 years. In earlier studies, the gas-driven compressors won the cost of ownership and reliability

comparisons. Recently, all focus has been on removing a stack. (Can we say tunnel vision, boys and girls?)

Do I really have to repeat that that blind focus on an issue at the exclusion of all others is a less-than-optimal path to success? When you focus on emissions within the fence line, you ignore the CO2 per kWH that must spew out of someone else's smokestack down the road. That is true even with 20% of Texas power provided by renewable sources.

In a proper big-picture look at replacing a fossil fuel compressor with an electric compressor, the first question is whether the existing exhaust stack is in a large urban area where it combines with other sources to create a site-specific air quality issue. If the focus stack is in an area with the same air quality as the coal-fired power plant down the road, within the fence focus blindly moves us toward a solution that has lost many comparison tests in past years. In terms of cost of ownership, the gas company owns the natural gas, which they use without markup in a machine with about the same efficiency as electric generators. Those generators are fueled by, for simplicity's sake, natural gas bought at a marked-up rate. The natural gas company then purchases the marked-up electricity to run a motor with something less than 100% efficiency. This results in an overall fuel usage and cost increase when using the electric motor versus the natural gas-fueled engine.

A bottom-line emissions comparison removes cost from the equation to compare engine-driven compressor efficiency versus the combined efficiency of generators, electrical distribution systems, and electric motors. This effort to be green within a fence line, therefore, increases overall emissions.

The increased cost of ownership was all we had to say in the olden days to support the answer the client wanted in the first place. Reliability was our ace in the hole for times when electric rates were down as compared to natural gas costs. As far as fuel supplies go, natural gas at a natural gas pipeline facility is as dependable as it gets. The only time you do not have natural gas is when there is no natural gas, which means you do not have to run the compressor. Problem solved.

There was a loss of electric power during the Texas deep freeze of 2021. Outages extend when natural gas generators run out of fuel because electric natural gas compressors are unable to run. Then comes the issue of how to restart electric driven natural gas compressors without natural gas generators that provide over 50% of Texas electricity. The answer, of course is the big, old, nasty, reliable coal plants have their power specifically switched and directed to circuits having electric natural gas compressors. If you were lucky enough to be on one of those circuits, you got your power back as much as a week before other people.

Why don’t the natural gas facilities have backup generation? Did I mention that the cost numbers for the switch to electric were not working in the first place, let alone when adding backup generation? That is more than adding that Generac unit to your house. The gas compressors are big engines in the thousands of horsepower. It takes a generator three to six times the HP of an electric motor to start that electric motor. That means a generator costing millions of dollars that we would not have needed if we had just kept our natural gas-fired compressor. Oh, and that backup generator cannot run on natural gas, so it belches clouds of black diesel smoke when needed and during 15-minute test runs every week. Canceling weekly test runs to achieve inside-the-fence emissions goals means the generator is far less likely to start when needed, and we are right back to waiting for coal plant power to restart the natural gas system.

Aren’t we so proud of our efforts to be green within our fence line?

Deliver One Oven Microwave Combo by April 14

Specific:	Oven Microwave Combo
Measurable:	One
Achievable:	Vendor Says it is
Resource-Driven:	Yes, but not a problem
Time-Based:	April 14

My daughter bought a home with a kitchen built in the seventies. After hours of research for her update, she decided on a specific Oven Microwave to fit her twenty-seven-inch opening. Thirty-inch ovens were readily available, but twenty-seven-inch were impossible to find. Shopping in January, the best date for delivery was the middle of July.

To help her, I searched and found an online vendor who said they could deliver the unit in the middle of April. April came, and the vendor said the manufacturer had moved the delivery date to May. In May I called the vendor, and the date had been moved to the middle of June. In the middle of June, they said the date was the end of June. End of June they said the middle of July. Middle of July they said end of July. I was busy at the end of July and did not ask again until early August. I learned the manufacturer would provide the Oven Microwave in 7 to 10 days.

Wondering if the vendor was just yanking my chain, I decided to call the manufacturer myself to see if they were building any of the Oven Microwave combos soon. My first attempt to get a delivery date got me to technical services. Minutes later, technical services and I came to the mutual understanding that I was talking to the wrong person. The next person did not know when or if any Oven Microwave combos would be built and transferred me to someone else. The next person also knew nothing about deliveries or production. The fourth transfer was able to tell me that the oven-microwave combo was in transition.

"Transition, as on a truck?" I asked.

"No, transitioned from an order to a manufacturing request," the lady said.

"Can I talk to the factory where it is being built?" I asked.

"I don't know where it is being built," she said, "We have factories in Canada, Ohio, and Mexico."

"Do you have the phone number for the factories so I can ask them?" I asked.

"No, I don't have their phone number," was the response.

"Do you have a company phone list?" I asked.

"No, there is no company phone list," she said.

“So, you have no idea when or if this will ever be built?” I asked.

“There are chip shortages,” she said.

“I just read that the Covid-related chip shortage issue has been resolved,” I said.

She hung up on me.

I shook my head, and my mind drifted back to an article I read earlier with a response to the question, “Do you know of anyone who has continued to work without actually doing anything?”

The most extreme example was Bob, a well-liked man seen daily at the steel mill with a clipboard in his hand. One day, management was in a meeting, pondering who they could get to fill a new position. One manager suggested Bob would be a great fit. “Will you be able to get by without him,” another manager asked yet a third person.

“He doesn’t work for me,” the other manager replied.

They eventually discovered that Bob did not work for anyone. After Bob had worked for the company for five years, there was a reorganization. Bob was lost in the shuffle. Unsure of who to report to, he went onto the steel mill floor with his clipboard. When payday came, there was his auto-deposit. For the next ten years, Bob was there on the steel mill floor with his clipboard. After the manager’s meeting,

Bob was at once let go. As an employee with 15 years of service, he received a sizeable severance package.

Asking about the Oven delivery, Bob came to mind because I wonder, in this post Covid world, the number of people working who have not really come back to work. I suspect there is a person at the oven manufacturer who is supposed to match orders with manufacturing requests. Another is supposed to match chip requirements with products that require chips. For several years, the chip person's job has been to tell people that they still have no chips. How long has it been since people just quit asking about chips? How long has it been since the person in charge of chip planning even picked up a phone? Now that there are chips again, it does not matter because the person in charge of getting chips where they need to be is watching their child or playing Words with Friends. All the other people who have jobs but use the lack of chips as an excuse for not doing anything will be the last to rat out the chip manager who is not doing anything.

I began this section shortly after the manufacturer representative hung up. A week later, I got a notice from the vendor that the Oven Microwave combo had shipped. This timing was only a month later than the mid-July date that everyone, except the online dealer I had used, had quoted. I bought from that vendor because of a mid-April date that excited my daughter.

It reminds me of things we all know but, hopefully, wishfully ignore when we hear what we want to hear.

- When something is too good to be true, it is too good to be true.
- In sales, resumes, interviews, and life, those who lie have an advantage over those who tell the truth because a liar's resources are unlimited. That said, I admire those who struggle through life with the disadvantage of honesty. You are my heroes.

Make Your Bed First Thing Every Morning

Specific:	Make your bed
Measurable:	Right down to the perfect corners
Achievable:	For most people
Resource-Driven:	As long as you have a bed
Time-Based:	First thing in the morning

Admiral William H. McRaven, in his motivational commencement address to the University of Texas at Austin, presents the goal of starting each day by making your bed. As presented, his edict is what every SMART goal should be. It is a simple task that people feel good about achieving that begins each day with confidence that carries through for all the larger more important tasks to follow. That said, I do not make my bed every day. (Of course, you do not, Mr. Contrarian, I hear you all saying.)

It is not that I do not know how to make a bed. My father was a Chief Petty Officer who could have been one of the drill instructors who forced candidate McRaven to eat sand during Seal training. I can very much picture my father making someone eat sand. It is not that once out of the Chief's watchful eye that I rebelled against bedmaking. Like the Seal recruits I appreciated the feeling of accomplishment

of a well-made bed. I do not make my bed because there is someone still in it when I leave the house in the morning.

When I say that person is still in bed when I leave, that is in no way casting dispersion. Our family game plan required me to get to work early so I could get home early so we could limit our daycare lady's workday to 8 hours. My wife, after getting to "sleep in," would get three kids ready for school and go through three separate carpool lines to drop those kids off before hitting the peak of Houston rush hour for her commute to her job as Director of Consultant Contracts for the Houston District of the Texas Department of Transportation.

Though she retired from the Highway Department many years ago, Civil engineering consultants throughout Texas still remember her. To this day many applaud her integrity that was a big part of transforming contractor selection from who you know based to qualifications based. A person in charge of distributing a billion dollars' worth of contracts a year is not the picture you had when I began by talking about someone sleeping in. I could, force her out of bed in the morning so I could achieve my bed-making goal, but I do not have a death wish.

My wife had her own make-your-bed goal for our then-teenage son. Rather than seeing the benefits as presented by Admiral McRaven, my son saw this as an opportunity to start a battle of wills. The lack of bed-making combined with a

general lack of application in school resulted in my wife and I, in an act of desperation, sending him away to military school to introduce him to someone who knew how to win bed-making arguments. To our disappointment, rather than teaching students to be men, that school taught students how to play the system. To achieve the SMART goal of a perfectly made bed every morning, students slept in a sleeping bag on top of the perfectly made bed that was never un-made.

While not really providing the quality education or character building that we had hoped, the military school did make my son miss his friends whom he begged to come back home to be with. We acquiesced and he did well enough in his last year of high school to graduate, but not well enough to get into any universities. He went to community college with the goal of achieving a 2.5 grade-point average so he could join friends at a state college. Still, he refused to make his bed.

Tired of the near-daily arguments about bedmaking between my wife and son, I made him an offer or an ultimatum. He could achieve a 2.5 grade point, and I would pay for any college he wanted to attend. Otherwise, he would join the Air Force.

A year later, my son was on a bus to Lackland Air Force Base. At basic training, the drill instructors did not play silly games. In addition to learning how to apply himself to the

point of earning a degree in electrical engineering after his time in the Air Force, my son also learned to make his bed. My wife nearly fainted when he won an award for best dorm room inspection. He is one of the finest young men I know. Still, he has a father who would get a failing grade for making a bed every morning.

Regarding my failing grade, Admiral McRaven could take the hard line and say failure is a clear indication that I am not seal material. (Whether related to success of the goal or not, I would agree with that assessment. Reading accounts of both Admiral McRaven and congressman Dan Crenshaw convinced me I am not now or ever have been seal material. It takes a special person to become a seal. God bless those who seek and achieve that path.) Alternately, regarding my specific bed making goal, the admiral might give me kudos for applying situational awareness to avoid sustaining a casualty.

Debunk Oblers' Paradox by the End of Chapter

Specific:	Debunk
Measurable:	Complete with calculations
Achievable:	With simple lighting design calculations
Resource-Driven:	With all the bright minds, why didn't they figure this out long ago?
Time-Based:	By the time you finish this chapter

Oblers' Paradox states: If there are an infinite number of stars in the universe, any line of sight from Earth must end at the surface of a star, and hence, the night sky should be completely illuminated and very bright. While attributed to the German amateur astronomer, not mathematician, not engineer, Heinrich Wilhelm Olbers, who described it in 1823, the name on the reference was not the first associated with the concept. English mathematician Thomas Digges, who lived from 1546 to 1595, postulated an infinite universe with infinitely many stars. Johannes Kepler, who was a mathematician and father of modern optics, touched on the idea in 1610. In the 1700s, Edmund Halley, that's right, the comet guy, and Jean-Philippe Loys de Cheseaux, an astronomer, got on the bandwagon.

In 1848, Eggar Allen Poe, of all people, in his 1848 essay Eureka, wrote, “Were the succession of stars endless, then the background of the sky would present us a uniform luminosity…”

The parade of stars, no pun intended, but funny how that worked out, continues in 1901 with none other than Lord Kelvin, the namesake of the unit of absolute temperature. More recently, Steven Hawking used the paradox to justify both his disbelief in infinity and God. I find that amusing because if the universe is not infinite, what is outside Hawking’s limited universe? I see the limited universe as a big ball. Just for talking purposes, let us say a basketball. On either side of the basketball are the ginormous hands of Boban Marjanovic (Noted as having the largest hands in the history of the NBA. He just beat out Shaq, so use Shaq’s hands if that works better for you.) In the case of the ball that is the universe that we think is not quite infinite, those ginormous hands belong to God. That is, again, only if the universe is not infinite. How is that? God is a bigger player in the case of a finite universe.

My take on the big fellow, God, not Shaq, is I believe in this life we are each creating our own heaven or hell. That said, I believe God is merciful. In terms of atheist, their hell is figuratively a long table just outside the pearly gates. God stops by from time to time to let those at the atheist table know he exists. “Is that you there, Steve?” God asks, “Isn’t it great being able to walk?” And Hawking’s private hell is

that he is furious about being wrong, first about God and now Oblers' paradox.

Anyway, before the quote from Hawking led me to the research that led to the other guys, I found a flaw in Hawking's assumption. The night sky is dark because, as facility lighting calculations tell us, intensity is related to the inverse of the relative distance to the source, squared. Beyond a certain distance, more stars add no measurable intensity to the night sky.

Equation for light intensity: $Id_2 = Id_1 / (d_2-d_1)^2$

A physical demonstration is drawing a 4-inch circle on your computer. Look at that over the top of a ruler held three feet away, and the measure is about 1 inch. Considering proportionality between light intensity and the circle area of, say, a flashlight beam, the comparison is 12.6 square inches versus 0.8 square inches. That is with a three-foot difference. When discussing light years, a light source the size of our sun reduces to the size of a star. At just over a couple of hundred light years, the star is just a pinprick. At billions of light years, the star is like an atom of oxygen that is invisible to any form of magnification known to man.

Talking in terms of a facility lighting calculation, the footcandles produced by the night sky are 0.00001 or in scientific notation, 1.0E-05. Daylight is about one thousand footcandles. That is 1.0E+09, or one billion times more than night sky illumination. There are about 5,000 visible stars,

equating to 2E-09 footcandles per star. The median distance to the visible stars is 185 light years. Beyond stars visible with the naked eye, a three-inch telescope, which makes pinpricks visible, brings 335,000 stars into play at a median distance of 2000 light years. The Hubble telescope can see two and a half billion stars at a median distance of, say, one million light years. (It is much farther, but a million is plenty to make my point.)

Doing the math:

3” Telescope	$2 \times 10^{-9}/(2000 - 185)^2$
	$= 6 \times 10^{-16} \times 335,000$
	$= 2 \times 10^{-10}$ footcandles
Hubble Telescope	$2 \times 10^{-9}/(10^6 - 185)^2$
	$= 2 \times 10^{-21} \times 2.5 \times 10^9$
	$= 5 \times 10^{-12}$ footcandles

Brightness of visible stars + visible with 3” telescope + visible with Hubble =

Visible stars	1×10^{-5}	5000 stars
Visible with 3”	2×10^{-10}	335,000 stars
Visible with Hubble	5×10^{-12}	2,500,000,000 stars

$= 1 \times 10^{-5}$ same as 5000 visible stars

Adding over two and a half billion stars has no appreciable impact on the visible light of the night sky and neither would infinite stars out to infinity.

Why would brilliant men of history miss such a simple solution? It is math and simple math at that. However, before the light bulb there was no such thing as lighting design so Lord Kelvin and others before had that excuse. Did someone a brilliant as Steven Hawking have his head stuck in the sky for star answers and at the same time, stuck firmly on the ground for God answers? Something I have witnessed is that those who take pride in their own brilliance may turn their ears and eyes from anything that might challenge that brilliance. Sometimes the best, and correct solutions come from unexpected sources. Thoughtful resolution can lead to progress.

SMARTER Goals

In the original SMART goal article, Doran said, “It is unrealistic to think that all objectives can be quantified. Corporations can lose the benefit of a more abstract aim to gain quantification. It is the combination of a goal and its action plan that should be the focus of management.”

As exampled with the firefighters, there are jobs where there are unquantifiable tasks done at unspecified times. When we attempt to set goals for the firefighters, we risk staying at the firehouse for a scheduled weekly inspection instead of promptly responding to a fire. Clean truck goals incentivize not responding to fires at all. The minimum number of fires per year encourages arson. Tunnel vision can lead to disaster.

Specific, time-based goals can leave us on a path overcome by events. If you must use SMART goals, think Specific, Measurable, Achievable, Resource driven, and Time Related rather than the multitude of other definitions. Make those goals SMART-ER by incorporating Event Recognition. When a need has disappeared, work on goals at a time after March 1 to take advantage of new discoveries. The paradox is how do we work on goals throughout the year without work on goals overshadowing our other work.

The first step toward good goals is asking if goals are even needed? Goal proponents then ask how people be properly rated for bonuses and merit raised without goals?

The answer to that is that bonuses and merit raises are popularity contests anyway. Using silly self-written goals to disguise the popularity contest produces misdirected focus and possible rewards for inappropriate actions.

Therefore, people writing their own needs to stop. Managers need to get their heads out of their spreadsheets and determine what employees must do to meet corporate goals. If there is an overarching goal, like SpaceX successfully launching a rocket by a given date, the goal for each group is what they must contribute to achieve that rocket launch. Each member of the group is a cog in a well-oiled machine that will crank out the specific steppingstone on a path towards the overarching goal.

If there is a hiccup, rather than hiding it to maintain the path toward an invalidated target, acknowledge the hiccup and the new path it demands. When a world beating idea appears, insert it into goals at once and give the originator the credit they deserve rather than languishing on a course towards mediocrity. Spend time with your employees, get to know them, and learn how they can do more than make numbers move on spreadsheets.

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