Technology Tsunami Headed toward US Shores

Ideas to Mitigate the Impact

As computing power continues to increase, all countries will experience the effects of more sophisticated software, more complex hardware, including more agile and dexterous robots. How well countries manage the integration of more technology will have a major impact on sustained economic growth and wealth creation.

Transitioning to and integrating new technologies has occurred for centuries. Not all countries have managed the transition effectively. There are many examples of countries that at one time were world economic leaders under one technology who now are middle of the pack or also-rans.

The United States faces similar risks without proper preparation for the coming "technology tsunami." The problem the US faces, and other counties as well, is the earthquake triggering the tsunami has occurred and tsunami waves are headed to shore. Like the tsunami, waiting for wave to be visible means it's too late to take any meaningful action to avoid major destruction.

Discussed in this booklet are ideas to prepare the US for the technology tsunami. Much of the effect of the tech tsunami can be mitigated if programs are started now. Waiting is a recipe for becoming an economic also-ran.

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Source for Articles in This Booklet

The source of articles for the technology tsunami booklet is a blog I started in late 2013. The theme of the blog is about issues I believe will contribute to a fifth (5th) revolution in the United States, beginning sometime after the year 2020. The idea of the revolution, titled the "Revenge Revolution," and the timing emanated from some research I did in 2010-2011. The entries in the booklet are from the blog with some minor editing and graphics added. More about the origin of the blog and what are counted as previous US revolutions in Appendix A. Link to blog, www.usrevolution5.com.

Background to Technology Tsunami Series

For most people, the center of their universe is not events in Washington, DC but what happens their city, their neighborhood and especially their household. A key issue that seems to be getting less attention than it deserves at the national and local levels – maybe because of all the noise emanating from the Trump White House – is how the implementation of technology worldwide will change a family's earnings structure.

We've seen some of the changes already, with the reduction in manufacturing jobs and the multi-decade stagnation of income (adjusted for inflation) for a large segment of the population. In my view the changes so far are just a small taste of what is to come. There are already numerous early warning signs of the coming "technology tsunami."

An example – the announcement by General Motors in November 2018 of its intent to close five (5) plants in North America. Another warning sign is a story in the New York Times about a robotic arm playing the piano. While a robot playing a piano may seem like a bit of a novelty, think about the implications. The more dexterous robots become, the more robots can perform tasks of people who are highly skilled. Robots in warehouses and welding or painting cars/trucks are commonplace. Those tasks are fairly straight forward compared to cooking or performing surgery or a host of other tasks.

Over the centuries societies have coped with implementation of new technologies. Some societies have adopted new technologies and succeeded; others did not adopt new technologies and fell behind. An example -- in 1910, GDP per capita in Argentina was about 80% of US GDP per capita. By 2010, 100 years later, GDP per capita in Argentina had fallen to about 30% of US GDP per capita.

Adopting new technology successfully is very difficult. There are a couple of interesting books about how and why few companies are able to adopt new technologies successfully. A short write-up of the conclusions of the books in Appendix B. For now let's get started. As you read, keep in mind how the disruption caused by adopting new technologies might compound societal problems currently facing the US. Numerous factors point to another revolution in the US – the technology tsunami could accelerate the Revenge Revolution and make it worse. And, yes, Mrs. Lincoln, enjoy the play.

#1 Technology Tsunami Headed toward US Shores (Link to Blog Entry)

After General Motors announced plans to close five (5) plants in North America (November 2018), I was asked by several friends and colleagues for my opinion of the merits of the decision. While I had no inside information, based on my experience at GM and additional analysis, I concluded GM made the correct decision and should be congratulated.

To explain my logic in more detail, I wrote a couple of informal articles and published links on Facebook. The articles included the term "technology tsunami," which I thought might help explain some of GM's rationale for closing the plants…and why GM's decision might portend what's ahead for other companies. (GM had additional reasons for the closings. Links to articles[1].)

Reaction to the term "technology tsunami" seemed to beg for more explanation. So, here goes. I selected the term "technology tsunami" because the characteristics of a tsunami seemed to be a good proxy for how the wave of artificial intelligence (AI), increased use of robots, implementation of the blockchain, and other technologies will affect employment in the US. The effect will not be limited to the manufacturing and some service sectors but include many white-collar professionals (GM, for example, laid off more salaried white-collar staff than hourly manufacturing workers.)

First let's look at the sequence of a tsunami. The start is often an earthquake or volcanic eruption deep in the ocean. The energy from that quake is transferred in the form of a series of powerful ocean waves. In the open ocean, the change in the wave pattern caused by the earthquake is not necessarily apparent. To the naked eye, tsunami waves appear relatively normal.

The strength of the waves becomes more apparent as waves move closer to shore. As the waves start to come ashore, the waves are compressed. The more gradual the slope of the shoreline, the more compression.

And there is not just one wave that is compressed and hits the shore, but a series of waves. The waves are powerful and of such height that virtually everything at or near the shoreline is completely destroyed. The waves continue inland, causing significant damage. A tsunami usually is more powerful and destructive than the surge associated with a hurricane.

An usual characteristic of a tsunami is how it affects the waterline preceding its arrival. As the tsunami gets closer to shore, the water at shore's edge recedes. The shoreline looks as if there is an exaggerated low tide. This phenomenon might last several minutes. Then, the waterline

[1] JRD Reaction to GM's Announced Plant Closings GM Plant Closings Tsunami Canary

changes quickly and drastically as repeated high and powerful waves come ashore, destroying virtually everything.

With that picture in mind, let's examine how a technology tsunami might affect employment in the US. In my view, the earthquake has already occurred that will cause the technology tsunami. The energy from that quake has been transferred to form of a series of large and destructive waves. And those waves are headed toward the US shore. Warning signs of the tsunami are becoming more evident at the shoreline as the waterline has begun receding.

The US shoreline is filled with people. Many at the shore still work in manufacturing and service industries. However, few at the shore seem to understand the implication of the receding water line and even fewer take action to avoid the pending disaster. As the waves roll closer to shore, the beach remains filled with people.

In the next few moments – for this analysis consider next "few moments" as next "few years" – the pending disaster becomes apparent. The waterline begins moving ashore rapidly as the first of a series of giant waves becomes visible. The people at the shore – those with limited education and skills – try to escape, but it is too late and waves overwhelm them.

The powerful waves continue inland, destroying many long-standing structures, once thought invincible. Much is lost and chaos ensues for those who survive.

Am I overreacting to the potential impact of a technology tsunami? Is a technology tsunami even possible? Or, as a couple of people have suggested, am I being like "Chicken Little"?

My concern about a technology tsunami has less to do with whether artificial intelligence will become smarter than humans and more to do with the potential impact on the stability of society. How many lower-skilled, semi-skilled and even skilled blue and white-collar jobs will technology replace?

Trying to stop implementation of technology is foolhardy. Depending on when in time such a stop-technology approach was implemented, today we might be travelling by horse and buggy and living without electricity, telephones, tv/radio, computers, internet, etc.

And yes, I agree that societies have survived major technology disruptions in the past. But transitions to new technologies have rarely, if ever, been smooth. Even worse, countries that did not transition to new technologies became also-rans.

During the technology tsunami, what is likely to happen to societal stability in the US? How will people react who are replaced by technology? As middle-class jobs continue to be

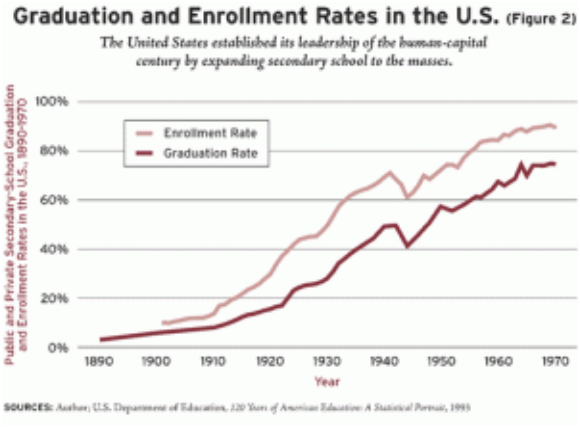
eliminated…and many new jobs are at lower pay, if available at all…will people sit idly by? (When formulating your answer don't be misled by the unemployment rates in recent months. Look at constant-dollar median incomes over time compared to GDP per capital. Income has not kept up with productivity. Also significant wealth has transferred toward the very top. The longer-term trend is a much smaller middle class with less wealth accumulation.)

If a technology tsunami seems possible, then what are we…societal we…doing to prevent a likely social upheaval that follows the tsunami? As best I can tell, we are doing nothing of substance. Policies of the Trump Administration seem to be focused on preventing adoption and even overturning technology rather than planning how to manage the transition.

In a way, the logic for why we should prepare for a technology tsunami is similar to the logic of why we should make efforts to prevent further global warming. Who's right about the cause of accelerated global warming does not matter. If global-warming deniers are correct and man has contributed virtually nothing to global warming, the consequences are the same…and the consequences are not good. By doing something, then there's a chance to reduce the negative effects.

Since we have a good idea of the effect of a technology tsunami, how do we start preparing? Maybe the first step should be to look at the 1930's. In response to widespread unemployment (at least 25%), reduced net worth among most families, and no clear prospect for an economic turnaround, FDR and Congress implemented programs to create jobs. Creating jobs had a twofold effect: (i) putting money into people's pockets so they could begin buying again; (ii) allowing families to regain self-respect.

One can argue about the efficacy of specific New Deal programs. However, there should be little argument that these programs helped bring stability back to US society.



Part of the New Deal not often discussed is the effort to increase participation in public education. During the 1930's, many grammar and high schools were built and students encouraged to complete high school.

The efforts resulted in a sharp increase in the percentage of the population graduating from high school. The increase in percent graduating from

high school continued until the 1970's when the rates plateaued.[2]

Emphasis on education continued after WWII with the GI Bill of Rights and then with availability of low-cost loans encouraging more students from lower- and middle-income families to attend college.

The lesson of these programs for today? Existing and emerging technologies require more math/analytical skills to utilize capabilities of the technologies. With the need for more math/analytic skills…and the risk of becoming an also-ran country by not adopting the technologies…what actions do we take? How does US society get more people educated, especially those on the shore unaware of the pending technology tsunami?

Following are some ideas. You'll likely look at the list and say, "What's so innovative about the list? I've heard these ideas before." And, you're right. The ideas are not new…but you know what? We're not implementing them, and in some cases we seem to be regressing.

The list is intended to start the discussion:

1. Help society understand that expenses for public education are investments, not merely costs. Investments may take time to payback but result in a benefit that spans generations.
2. Increase pay for…and respect for teachers. Make the qualifications and salaries for teachers competitive with, and possibly slightly above, the private sector.
3. Reinstitute more technical training in high schools. Almost everyone agrees not everyone is suited for college. Not attending college does not mean one does not have valuable skills. Far from it. The public schools should provide everyone an opportunity for training in how to use, leverage and maintain technology skills. At one time "technical training" was common in high schools. Time for it to return.
4. Make loans for college affordable with a provision to "earn-out" the loan over a reasonable period. Unlike today, make compliance for the earn-out provision easy to understand and execute. Provide assistance to the participant – not everyone is an expert at filling out government paperwork. Encourage people to become teachers. Don't discourage them with onerous penalties for slight mistakes in completing paperwork.
5. Cut back, or eliminate private charter schools. Yes, all organizations need fixing over time. Public education is no exception. But charter schools are not necessary to fix problems in public education. Charter schools destroy the very foundation of public education…and operate with far less accountability. The trend toward charters needs to stop and charters eliminated.

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[2] 120 Years of American Education: a Statistical Portrait

6. Create meaningful education programs for older workers. The claim by some that "I'm too old to learn" is an excuse, not a reason. My experience has been many older people are embarrassed to ask for help. When assistance is framed the right way, it is rare that someone turns down the opportunity to learn. We…again societal we…need to be flexible in how we approach teaching students, whether the student prospect is in grammar school or a grandparent.
7. Implement meaningful education programs and works-skills programs in prisons. Incarceration is incredibly expensive. While different studies include different amounts for overhead and other costs, the least amount of cost per year to incarcerate someone is roughly the same as tuition, room and board at a state university. In many studies, the cost is multiples higher than tuition, room and board. Incarceration without rehabilitation is wasted money. Educating prisoners and having prisoners do meaningful work while incarcerated seems to be "common sense."

How do we implement some of these ideas? More in the next entries.

#2 Personal Experience Developing AI and Implications for Skills and Employment

When discussing the coming "technology tsunami" I've noted that with the increased use of artificial intelligence, many current workers will need to increase skills in order to remain employed. But just what is artificial intelligence? How can it be used? To make AI more concrete and less abstract, I thought it might be interesting to allocate the next couple of entries to describing some personal experience developing AI and what happened as a result.

First, let's go back to define just what constitutes artificial intelligence, or AI? (Readers, please keep in mind this is not an article for an academic journal. The article is aimed at trying to help the general populace understand more about what AI is and how it might affect the workforce.)

The term "artificial intelligence," which was first used in the 1950's, seems to be applied to an ever-increasing range of computer-based applications. Much of AI we hear about today has been developed by applying to very large data bases sophisticated multiple regressions (regressions look for an association between one action/word and another). The algorithms that result become the foundation for software to support an AI application. What has expanded the use of AI is the availability of very large databases and much more computing power. However, as demonstrated by this example, a useful and effective AI program can be developed without an overly large database and/or staff.

A question associated with AI, "When AI is implemented, and will people be replaced?" Yes, but people have always been replaced with the introduction of new technology. Farm hands were replaced by tractors and mechanical harvesting equipment. The printing press replaced scribes. The telegraph replaced the Pony Express. Trains replaced stage coaches. Cars replaced buggies…and endless other examples.

In the current wave of AI, the jobs that seem most vulnerable in the near-term are ones that involve repetition. Jobs where running a software program or using robot could perform most or all of the task. Such jobs might be assembling parts, loading/unloading shelves, providing certain types of information (clerks, including law clerks could be replaced by a more sophisticated Siri, for example), completing forms or completing some basic analysis (proof reading, financial analysis, etc.), steering vehicles and similar jobs.

The list of vulnerable jobs is quite lengthy and includes a considerable number of white-collar positions. As noted earlier, when General Motors announced in fall 2018 the intent to close five plants in the US/Canada, more white-collar workers were affected than assembly workers.

OK, how about a real-world example. In 1980…yes, that was many moons ago…I transferred to headquarters of Buick Division from the General Motors Treasurer's Office in NY. One of the staffs I managed at Buick was responsible for forecasting sales – short and long-term. The short-term forecast – 180 days – was used to set production schedules at assembly plants and suppliers.

When I arrived, the accuracy of the forecast was abysmal. Even though Buick had been in business about 75 years, it was not uncommon for forecast sales for the current month to miss actual sales by 30-40%...sometimes 50%. Such a variance made it extremely difficult to manage inventory. The forecast/actual discrepancies also caused frustrations with Buick dealers because arrival dates for cars ordered varied widely from the original schedule, which in turn frustrated customers.

To increase the accuracy of the forecast, we developed an application of AI. The AI-based forecast consisted of three key estimates: (i) industry sales; (ii) mix of sales by category – % small cars, % mid-size cars, % full-size, % SUV's, etc. – within the industry; (iii) Buick % share within the general categories.

Unlike today, at the time most assembly plants were limited to a few models with little variation in size. Further, changing the production mix at an assembly plant could be time consuming and costly.

Before our AI-based solution, Buick's solution to this dilemma (and common in the industry) was to "force" the dealers to take the mix of cars produced. Further, there was little recognition of differences in consumer preference by region of the country. Dealers in New England, where smaller cars were preferred, would end up with mix of small/large cars very similar to the dealers in say Texas, where larger cars were preferred. "Encouraging" dealers to take the production mix required the field staff to spend considerable time with the dealer and often involved some type of costly incentive – free financing, extra cash per car, etc. Dealers would then have to try to steer customers to these "unwanted" cars.

The solution to fixing the problem was conceptually simple: (i) a more accurate forecast; (ii) allowing dealers to order what cars they wanted. Improving the accuracy of the forecast was the critical first step. Doing so required building a math model that would predict more accurately upcoming changes in demand.

Previous sales forecasts had been based on changes in the rate of actual sales, primarily how sales the past few months compared to the previous year. Basing the forecast on "lagging indicators" – sales the past few months – is akin to trying to drive a car by looking only in the rearview mirror. Doing so reduces one's speed and increases the chance of making a serious error. The previous method of forecasting was always "catching up" to changes in demand rather than being ahead of the curve.

Developing the AI model was remarkably easy – or so it seems now. We ran regressions of historical sales data for the industry as well as Buick. Fortunately, the auto companies had been reporting monthly sales for many years, so the data base was credible. The results of the regressions yielded useful, seasonal patterns. We also analyzed the shift in mix of sales over time. This helped determine if sales of smaller cars were increasing faster or slower than say mid-size or luxury cars. Another task was estimating how many people were switching from cars to what were then early-version SUV's. At the time Buick did not offer an SUV so these buyers were being taken out of Buick's potential market.

Finally, we had to determine Buick's likely share of each category. At the time the overall car market was shifting to smaller cars. While Buick had competitive smaller car entries, it was more successful in larger cars. The effect of the shift in consumer preference was profound. Even though in a given month Buick could gain in market share in every major industry category compared to the previous year, that same month could show Buick's overall share had declined compared to a year ago. That phenomenon was always fun to try to explain. "Yes, we gained market share in every category…but, no we lost market share overall."

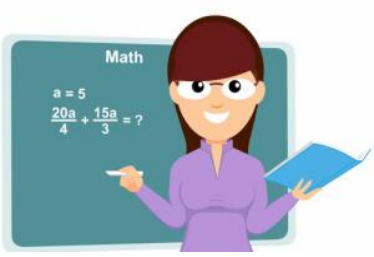
Within about one year of starting the AI model, the US experienced a major economic downturn and industry vehicle sales took a nosedive. The AI model helped Buick management begin to make more informed decisions about setting production schedules and marketing plans. With the implementation of the AI-model, the accuracy of the forecast improved markedly. Rather than a variance of 30-40% between actual and forecast for a given month, the variance was reduced consistently to less than 5%. The improvement helped smooth production schedules, reduce short-term layoffs and/or overtime at Buick and suppliers and made lead-times for deliveries to dealers much more accurate.

The increased forecast accuracy allowed Buick to migrate to what is called a "free-expression" forecast and production schedule. Dealers were allowed much more freedom to order the number and model of cars they wanted.

The decision to migrate to "free-expression" forecast/production caused great angst among staff members tied to the old "dealers-will-order-what-we-tell-them" system. In the end, however, most everyone became a convert as overall production volume and mix were about the same as before, yet orders by individual dealers in different regions of the country were markedly different than under the previous system.

Other benefits of the AI forecast model? The field staff was able to spend more time helping dealers with marketing programs, working on customer satisfaction and finding ways to improve profitability. The dealers then started to order more cars from Buick because the turnover rate improved. In the three-year period following implementation of the AI model, Buick increased market share more than any other manufacturer, domestic or foreign. While not all the gain in market share can be attributed to the AI model, the number of new products Buick introduced during the same period was limited, so most of the gain in market share came from "non-product" activities.

What happened to employment? Buick reduced the number of field offices from 26 to 20. Buick also started a call center to increase contact with dealers located outside urban areas. The non-urban dealers still received some personal visits, but less frequently.



Use of AI also changed the skills required of the office staff. To be effective in the new environment, staff members needed more skills in math, statistics, economics and marketing. If today's computing power were available then, we could have cut the staff in half, possibly more. Even skills of and the number of senior managers would have been affected. At the retirement party of a key sales executive, who'd grown up in the days of "gut-feel" and "seat-of-the-pants" forecasts, the retiring executive told me – after several drinks – "I never understood what you were talking about, but I trusted you." I appreciated the compliment but was a bit taken aback by the admission.

Does this example help us look ahead for what might happen when more AI is implemented? How does this rather simple application of artificial intelligence affect Buick?

+ Increased sales
+ Increased market share
+ Increased profits
+ Increased customer satisfaction (dealer and buyer)
- Reduced employment
- Higher skills required of employees

Lesson to Consider: If you're a shareholder and/or your compensation is tied to profits, you will view the results of implementing the AI program as positive. If you're an employee whose job was eliminated and/or you were unable to learn the additional skills required, you will view the AI program as negative. The inherent conflict between perspectives, unless we quickly start to manage more effectively, will likely be another contributing factor to the Revenge Revolution.

#3 Using AI for Profiling – Birds of a Feather Flock Together

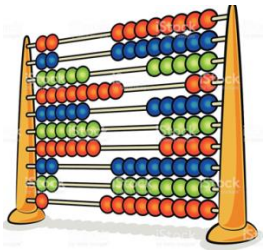
A widespread use of AI today is what is called "profiling." Ever notice after you've searched something on Google, an ad appears for the product? How does the computer know?

This entry and Entry #4 discuss how AI was used to create "profiles" and how those profiles were used in a commercial application. The examples in Entries #3 & #4 are "early stage AI" and intentionally selected to demonstrate: (i) AI applications that are easy to understand: (ii) AI-based applications have been around for a number of years; (iii) how AI can be used to increase the effectiveness of "gut-feel" profiling.

The concept of profiling is simple. Profiles are based on the assumption that "birds of a feather flock together." That is, people with similar profiles have similar behavior.

Of course, not everyone in the flock, or profile group, behaves the same way. But to the user, profiling is not about individuals but about probabilities of member in the group. What percentage of the people in the profile group will behave a certain way? The goal is to create a group, or profile, where there is a high likelihood that members will have a specific desired behavior.

Profiling is not a new idea. Profiles existed for eons before being formalized with computer programs. Further, virtually everyone creates profiles. Most all of us put strangers into categories based on such factors as geographic location, appearance – skin color, hair color, hair style, clothing, etc. – age, education and a host of other criteria. Think back to someone you met, then after you got to know the person much better, said to yourself, "Gee, that person is a lot different than I first thought."



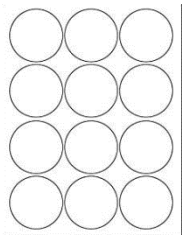
As for this entry, the first example seems rather crude by today's standards. At the time the profiling technique described was considered "state-of-the-art." Remember an abacus was considered state-of-the-art when introduced.

The time period for this entry is the mid-1980's, at Buick Motor Division of General Motors, where I'm director of marketing. As described in Entry #2, Buick has used AI-

programs to improve the accuracy of its sales forecast and to start allowing dealers more discretion when ordering cars.

The next logical step to try to continue building market share was helping dealers refine how to order the appropriate number and mix/models of cars. For example, dealers in the Northeast knew smaller cars were preferred, but which ones were likely to sell more rapidly in a dealer's particular sales area? Same problem with dealers throughout the country.

I do not remember who or how the introduction was made – could have been one of the "crazy phone calls" the staff often accused me of taking – but Buick was introduced to a company called Claritas. At the time Claritas had combined zip code and general demographic data for the entire US. The results were "clustered" into 40 groups, or profiles. Each profile had general buying information for products ranging from food to wine to vehicles to many other items. Claritas also assigned a descriptive and memorable name to each group. Some examples of names of group – "Pools & Patios," "Furs & Station Wagons," "Hard Scrabble," "Down-Home Gentry," "Blue Blood Estates," etc.



As I recall Buick was the first auto company to use the Claritas profiling. We introduced the concept at the annual dealer announcement meeting. And then not much happened for several months. Finally I got a call from a dealer who purchased a store in Florida that had gone bankrupt and was in the process of converting to a Buick store.

The call went something like this, "You remember that program you told us about at the announcement meeting? I've forgotten the name of the program but do you think it might help me order the cars more effectively for this new store?" We asked for the zip codes he thought most likely to consider shopping at his dealership. Based on the zip codes we suggested a mix of cars to consider ordering.

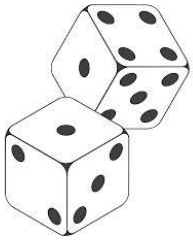
About six months later, my wife and I were hosts on an incentive trip for dealers. During cocktail hour one night, the dealer said, "I owe you a drink. You've made me a ton of money." As he told the story, the profiling program had been a major contributor to helping him turn what had been an unprofitable dealership into one that was very profitable. And, yes, I let him buy me a drink…even though drinks were already paid for.

He told his success story to many other Buick dealers and the use of the program became more widespread. What seems like standard marketing procedure today was anything but standard then.

Within a couple of years starting to work with Claritas, Buick developed a variation of an existing car that designed to appeal to a very small audience. Because introducing such a "niche" car in the traditional way would be too expensive – major national tv and print campaign that could eat

all the potential profits – we decided on a targeted campaign using the information from Claritas. What was the result of promoting the niche car to selected profiles – "Pools & Patios," "Blue Blood Estates" and a few others? A very successful, and profitable, introduction.

What's the status of profiling today? Profiling has migrated from projecting buying patterns



based on 5-digit zip code to neighborhood profiles (9-digit zip codes) to profiles by families to profiles for individuals within the same household. The same philosophy applies – birds of a feather flock together. However, the flock is no longer defined by geography but by attitudes and behavior gathered from information on search engines, websites, on-line purchases and social media platforms. Profiling is still about probabilities – and not individuals – even though the clusters can include specific information about individuals within the group.

What does this migration portend for the future? One of the unintended consequences of profiling seems to be the diminished value of small geographic social groups. When one had more face-to-face interaction with neighbors, it was difficult to simply walk away from people with different opinions. While you might not always agree with your neighbor, one at least tried to be civil because that neighbor would be there the next morning and you might need to rely on him or her for something.

Amazon, on-line buying, delivery services, etc. have reduced the reliance on neighbors for many activities. No longer does one need to talk face-to-face with neighbors. One can replace face-to-face chats by going on-line and finding a chat room of like-minded people, thereby avoiding having to listen to the neighbor with whom one might disagree.

In the future are we going to continue only to seek others in our profile and therefore become more isolated? Maybe for a few more years…then I'm hopeful the tide will turn. The underlying premise of my blog (www.usrevolution5.com): the US is headed for a fifth (5^{th}) revolution sometime after 2020. I've labeled revolution as the Revenge Revolution. One societal change that I think will result is a return to neighborhoods. Some groups and communities have maintained active neighborhoods, but far too few. What I'm hoping evolves from the Revenge Revolution is a sense of cohesion among neighbors.

Yes, post Revenge Revolution you'll still be able to use your smart phone and order on-line. At the same time, people will become more aware of and concerned about others, especially those in their neighborhoods. Maybe naively, this awareness will help neighborhoods begin to have the feel more like the 1950's – not quite like Wally and the Beaver but a lot closer than today. And, no, in my view fences do not make good neighbors.

(In the next entry, we discuss how AI-developed profiles can be extremely useful in dealing with another individual. Of course, women have known about this for centuries. Men are still in the learning stage.)

#4 Artificial Intelligence Applied at the Micro Level – Personality Profiles

Much of Entry #3 discusses an AI application to create clusters of people with certain tendencies -- i.e., "birds of a feather flock together." A cluster includes people more likely to buy a specific type or brand of product. The entry also discusses how over the years the size of clusters has shrunk from zip codes to neighborhoods to households.

As the size of clusters has decreased over time, the focus has continued to be on behavior of the group without regard to say behavior of person X or person Y. For reference, think of ads in Facebook or Google…or efforts to sway voters. All those efforts focus on behavior of groups, not individuals. In the bluntness of terms, the advertisers do not care about you as a person as long as their message persuades a certain percentage of the group.

Even though social media platforms and on-line retailers have lots of data about your purchases, the ads are still a game of percentages. Think of these efforts as macro-economics – focus on the behavior of groups and not the behavior of specific individuals within the group.

What about behavior of specific individuals? What about what could be labeled as “micro-group” behavior? When focusing on the behavior of a specifically identified individual, can AI programs be useful…or harmful? The short answer is “Yes” to both.

As a reminder, these write-ups are designed for general discussion and not an academic journal or graduate thesis at a university. So please read the entries accordingly. If you cannot let go of your academic bent, then stop reading and go do something else. You can rest assured the data are credible and the approach sound.

Stating the obvious – to have a successful relationship in business or personal life, the relationship must be positive. A positive personal relationship in business does not need to extend to personal life. In fact, one can argue that it is better to keep business and personal relationships separate.

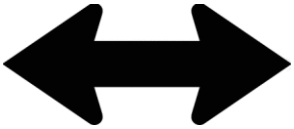
So how does one develop a positive relationship? A simple first step is trying to understand what makes the other person tick. How does he or she approach issues? How does he or she interact with other people? How does he or she determine what’s important?

At the end of Entry #3, the lead-in to this entry noted that, in general, women seemed much better than men at understanding what’s important/unimportant to another person. With age, many men begin to realize they’ve been “manipulated” by women for many years. If you’re a man…and don’t believe women have “manipulated” you…at some point you will probably realize what’s been happening for many years. Just accept the fact and move on. Just so there is no misunderstanding, most of the “manipulation” I’ve experienced has been positive.

So how do we better understand someone else? Can AI-based programs help us better understand that person?

An AI-based program that I've found extremely useful in helping me understand others is Myers-Briggs. A person's Myers-Briggs personality profile is developed by the respondent answering a number of seemingly simple, but quite insightful questions. Based on my understanding, the answers are then subjected to a series of regressions, which create a personality profile consisting of four (4) categories, or general attributes. The degree or amount of a category trait is noted on a continuum.

For example, one category describes an individual's preference to be around other people. At one end of the continuum is someone who absolutely loves to be around others (and dislikes being alone) – an "Extrovert." At the other end of the continuum is someone who strongly prefers being alone and finds being around others discomforting at best – "Introvert."



The continuum has a mid-point. Those on the say left side of the mid-point are labeled "E" for extrovert. Those on the right side of the mid-point are labeled "I" for introvert. The scale is not binary but relative so some people are more introverted/extroverted than others. While all category scales are relative, in some categories people tend to fall toward one of the extremes. General categories are:

- How people interact with others – Extrovert: Introvert
- How people gather information – Sensing (more analytical approach); Intuitive (more abstract approach)
- How people make decisions – Thinking (fact-based, analytical): Feeling (more emotion based decisions)
- How people tend to deal with the outside world -- Judging (prefer structure and firm decisions); Perceiving (more open and flexible environment)

An individual's profile is described by using one of the pair of underlined letters noted above. For example, one person's profile might be INTP; another's profile might be ESFJ. (If you want to learn more about Myers-Briggs and/or see what your profile is, lots of information on the web. Good start is https://www.verywellmind.com/the-myers-briggs-type-indicator-2795583. More on the history at the Myers-Briggs Foundation.)

If my experience is representative, one's profile can change a bit over time or in different situations. For example, in assignments where I've been responsible for "blank-sheet-of-paper" kind of projects, I've tended to view topics/problems as a set of possibilities. In assignments where I've been trying to provide more structure and discipline to an organization, my profile leaned more toward yes/no decisions.

How does one use Myers-Briggs profiles in real-world? A couple of examples.

1) **<u>1980's, Buick Motor Division, GM</u>**. Soon after being introduced to Myers-Briggs, another manager left and I inherited his department. While I was familiar with most of the members of the staff, I had never been responsible for direct assignments to those staff members.

   One staff member had undergraduate and graduate degrees from Ivy League schools. After completing an assignment the person presented a report with recommendations that were about 180^{o} from what I expected.

   My first thought was how someone that well-educated could have missed the mark so much. While going through the recommendations we were trying to figure out what went wrong. Rather than pointing fingers, the other person asked, "By the way, what's your (Myers-Briggs) profile?"

   When we compared profiles the answer to what went wrong became clearer. In that job, I was prone to paint the general picture for an assignment and not provide much detail. I was especially careful with this person given the educational background. Too much detail would be an insult to the person's intelligence, or so I thought.

   When I conveyed my concern about too much detail as an insult, the response was, "Oh, no, I like detail." Then the person proposed the following solution. When discussing an assignment, I would continue to provide detail until she (which you probably guessed by now) raised her hand, which meant, "I've got it. Stop." We implemented the hand-raising system and it worked wonderfully.

2) **<u>2015, Energy Company based in Houston</u>**. In the intervening 25+ years from Example #1, I'd been involved with a range of differing and challenging assignments – large companies, research organizations and start-ups. The Houston assignment was in an industry where I was familiar with the end product but not the production process.

   The management team had extensive experience on the field-operations side but needed someone to help set up the financial structure and reporting systems to help the business operate without a large overhead staff. After a few weeks of learning the very basics, I suggested everyone on the management team complete a Myers-Briggs profile. To give you an idea of what I didn't know about the industry, have you ever known a petrophysicist, let alone know what one does? Well, neither did I. But check YouTube. There's a video titled "Petrophysics for Dummies"…and it's very informative.

   As usual, some members of the group supported the idea of comparing personality profiles; others grumbled but went along and a few refused. The CEO was probably the most supportive.

As a reminder, we you start comparing personality profiles with others, remember a different profile does not make one person superior to the other. The profile points out differences in the categories described earlier, not skill levels.

When the CEO and I compared profiles, there were marked differences in a couple of key areas. Understanding those differences helped me frame and propose solutions in a way consistent with his profile. While I continued to approach and solve problems in a way I was most comfortable, I understood that to be more effective when presenting to him, I needed to frame the recommendations in a way consistent with his profile. It worked.

These are but two examples of using Myers-Briggs. I have many others. Why Myers Briggs? Aren't there other approaches to creating a personality profile? Yes. I used Myers-Briggs because it was the first approach I learned and one with the widest range of personal examples.

Is there a downside of knowing an individual's profile? Yes. "Manipulation" can be either positive or negative. A widely discussed example how profiling a specific individual might be used negatively is Donald Trump. The question raised by many, "Has Donald Trump been manipulated by the Russians as well as some conservative media talking heads?" Whether one leans left or right politically, president Trump's favorable behavior toward the Russians seems at odds with 70+ years of the post-WWII relationship between Washington and Moscow. (Let's hope more analysis of the Mueller Report evidence and other investigations makes the issue more clear.)

But we should not think that Trump is the only person subject to manipulation. Over time, all of us may be targeted individually. As AI programs become more sophisticated and as people convey more answers to personality-profile like questions on their social media posts and/or continue to buy more goods on-line through say Amazon, it will become easier for AI-programs to migrate from targeting a certain percentage of a group to targeting specific individuals.

Minimizing the influence of such targeting will require considerable diligence on everyone's part. More ideas developing such an approach in an upcoming entry.

Back to personality profiles. If you've never completed a Myers-Briggs (or similar) personality profile…or if it's been a few years…I suggest you get on the web and complete one (see links earlier in this entry). If nothing else, comparing profiles is great cocktail conversation. But I think you'll find your profile far more useful.

#5 Why Charter Schools Should Be Eliminated: Extra Cost to Taxpayers and More

In the entry describing the coming technology tsunami (#319), I suggested a way to help mitigate the impact of the inevitable tsunami was increasing support for public education. A major step toward achieving that goal would be prohibiting publicly funded charter schools…and publicly funded vouchers for private schools.

So what's the problem with charter schools? Why insist on publicly run schools? The private sector always accomplishes a task more efficiently and effectively than the public sector. Besides public education is broken and needs to be fixed. More support for public schools sounds like more socialism. Well, supporters of charter schools, if public education is socialism, then what would you call public support of private institutions through tax breaks and lower tax rates…try calling it by its real name, "welfare for the wealthy."

First, most everyone agrees certain aspects of public education need to be fixed. But maybe what needs to be fixed is not what advocates of more publicly funded charter schools claim needs to be fixed.

Public education per se is not the problem. What makes any school a good educational institution, whether public or private, is not the source of funding, not the school building, not how much money is spent on fancy support materials, not how good the sports team are…and a host of often discussed other "nice-to-have" items. What makes a good educational institution is commitment by all involved – students, faculty, parents and community. Education truly requires a community effort.

Look at schools where students get a great education and you will find a community supporting that educational institution. I agree that families which opt for charter schools may be more committed to education than other families. But why do we…again the proverbial 'societal we'…allow communities to "evolve" – maybe "dissolve" is more appropriate characterization – to a point where there is a lack of commitment to public education?

Charter schools do not help a community rebuild its commitment to quality education for all students. In fact, charter schools do just the opposite. Charter schools further erode a community's commitment to quality education for all by diverting mental support and tax-dollar support to privately run schools.

The idea of having a "specialized school" or certain education track is a good one. Both can be accomplished within the public school system. While the term might not be politically correct today, I was part of a group that for four years of high school had all "accelerated classes," other

than physical education. As far as I know, assignment to "accelerated classes" was based strictly on merit and anyone meeting the academic requirements was eligible.

New York City and other urban areas have long had schools specializing in certain academic fields. These schools have been open to all students in the system who met certain criteria. Thus, if a community wanted a more-specialized "charter-like" school, there's no reason why such a school could not be created within the exiting school system – many systems have "magnet" schools that operate within the larger public system.

A key aspect of charter schools not often discussed is the lack of scrutiny. Charter schools receive public funds, yet are not subject to the same oversight as public schools. Why? The answer is simple, but the answer should not be accepted by taxpayers. The lack of scrutiny is by the design of ownership groups of charter schools. The lack of scrutiny allows charter-school owners to avoid many of the rules required of public schools.

The theme of the charter-school owners? Just give us public money but don't ask how we spend it. Stating the incredibly obvious, charter schools are another version of efforts by the political far right to privatize major portions of the government and with privatization, minimize, if not eliminate public scrutiny.

A second key aspect of charter schools not often discussed is the true cost. Proponents of charter schools may claim the cost for operating a charter school is the same or less than a public school. The "proof" of the same-as or lower-cost claim is that charter schools receive only a certain amount from the state and do not charge tuition. But do charter schools really cost less?

Let's look at some costs. A very high percentage of the cost of education is fixed, or semi-fixed. Fixed/semi-fixed costs do not vary with changes in volume. As an example, think of your own house. Fixed costs for the house are the mortgage payment, taxes, maintenance, utilities and similar expenses.

Say there are two parents and three children living in the house. Then one child heads off to college. Now there's an extra bedroom not being used. So does the family just pack up and move to a smaller house?

No, the family stays in the house. And the mortgage payment is the same; the major maintenance expenses are the same; the bills for heat, electricity, water, internet are just about the same whether five people or four people live in the house. If you were calculating the cost per person to live in the house, the cost per person would be lower for five people compared to four people. While some other costs do vary with the number of people – food, e.g., -- the overall cost per person is higher for four people than for five.

The same cost structure applies in education. What are primary fixed costs in education – teachers' salaries, administrative overhead, building maintenance, utilities, much of the food-service staff and some other items? Thus, if say 20-25% of the students of a public school transfer to a charter school (think of the one child going off to college), most of the expenses for the public school remain the same.

But how are public schools funded? While the formula can vary by state or locale, many public schools are funded based on a payment per student. So if students leave for charter schools, the payment to the public school is reduced because of fewer students. The money follows the students so money that was formerly paid to public school is diverted to a charter school. While the number of students in the public school has declined, the costs for educating students did not decline as much as the loss of funding to the charter school.

So how is the loss of funding made up? Where does the extra money come from? Two sources: (i) taxpayers, state and/or local, who end up having to increase the amount of funding per student for public schools...and by default also charter schools; (ii) cutbacks of expenses at the school level. Students end up getting short-changed as less money is available to spend for supplies, extracurricular activities, teachers' aides, and maintenance. As maintenance is deferred over time, the building and infrastructure deteriorate. Eventually repairs and/or building a new facility end up costing even more than the deferred maintenance...another hit to taxpayers.

I did a rough calculation about the increased cost to taxpayers of charter schools. The estimates need to be refined with more analysis. Say 25% of the students transferred from public schools to publicly funded charter schools. Under this scenario, the cost per student for taxpayers would not go down, as some proponents of charter schools claim; the cost per student would not remain the same as other proponents claim; the cost per student would increase 20-25%.

Where is the added cost coming from? With the creation of charter schools, a parallel overhead cost system is also created. Rather than one "superintendent", there are now two – one for public schools and one for charter schools. Rather than one principal for a given school, there are now two because a second school was added. Rather than one building, there are now two. In addition, there are more teachers.

How does the public school manage with lower funding? The number of teachers for core topics remains about the same. What the public schools end up eliminating are teachers for what some people label as "non-essential" topics – art, music, Phys Ed…and oh, yes, those nurses and other health-care workers in the school system.

What is the motive behind charter schools? Why support a system that costs taxpayers more when there are no demonstrable benefits? Yes, some charter schools are more successful at increasing graduation rates. But many...and possibly more...are not.

With these uneven statistics, why not tweak the public school system to provide more specialized schools as many urban areas have for decades? The underlying reasons why charter schools are supported?

#6 Charter Schools Destroy the Fabric that Made America Great. Ban Charters.

Entry #5 discussed two key problems affecting public education: (i) charter schools erode trust in public education, which has been the cornerstone to America's innovation and economic prosperity. If you want to make America great again, then why destroy the foundation that helped make it great; (ii) additional cost to taxpayers for charter schools. Much of the cost is due to a parallel system of overhead required to support the charter-school system. The entry noted costs for education are not directly linked to the number of students. Major costs continue even if enrollment declines.

A third item referenced, but not addressed in detail, was the effectiveness of charter schools in having students achieve certain performance standards. Based on a number of studies, the efficacy of charter schools is mixed. Students at some charter schools perform better than when in public schools, some about the same and a surprisingly high percentage of students do not perform as well. (There are numerous studies comparing student performance. Results vary widely by locations.)

With such mixed results, why should there be charter schools? Why should taxpayers allow funds to be diverted from public schools to privately run schools where student performance is more often than not no better than public schools? And why divert taxpayer funds to charter schools where oversight of the organization and oversight of use of taxpayer dollars is less oversight than for public schools?

Would you let someone manage your 401k whose investment performance was iffy at best and over whom you had little control over investment decisions? If you answered yes…i.e., support lack of accountability of charters…then I've got a bridge looking for a buyer.

So the question, "Why not take all the time and energy devoted to diverting funds to charter schools and instead, work on improving public schools? We know one reason for charter schools is the obvious effort by the political far right to privatize as many government functions as possible. More importantly, in my view, charter schools are the lazy-man's solution to educating the populace. Educating people with different skills and different levels of motivation is a difficult task. Charter schools supporters are saying, in effect, "Send students to our schools who meet a certain criteria because we, as charter schools, are for profit, and don't want anyone to negatively impact our profit."

Charter schools, however, legitimately appeal to certain parents and/or students. Some reasons cited by parents and/or students for wanting to attend charter schools:

- Affordable option to private schools
- Option to enroll outside one's district
- Children of all backgrounds eligible
- Teaching approach innovative
- Find school that caters to child's specific needs
- Schools managed by organizations or groups of people

Satisfying these and other reasons can be accomplished in the public school system. OK, let's agree that certain basics need to be in place for all schools – building in good repair, up-to-date textbooks, easy access to the internet; adequate number of teachers and support staff. Within a community all the essentials should be in place for all schools. If not, then the deficiencies need to be addressed…and addressed before any charter schools are discussed or provided additional payments.

Then what are the underlying reasons for the variation in performance scores among the schools? I believe the first reason is lack of commitment within the community for adequate public education for all students. I understand you cannot mandate commitment, much like you can't lead a horse to water and make it drink. However, as a society we have to provide emotional and financial support for the education of students of the entire community.

Charter schools address some symptoms of what needs to be fixed in the community and the public school system. While charter schools address the symptoms, charter schools are also ripping apart the very fabric of public education. Charter schools are making the ability of a community to offer effective public education worse, not better. Charter schools are like turning up the sound on your car radio to drown out a bad noise coming from the engine. Duh, turning up the radio does not solve the problem. You've got to fix the problem in the engine.

By allowing students to opt out of the public-school system, we…societal we…are actually making the problem worse for students who remain in the public-school system. Many remaining students are likely to have less support at home. As more students leave the public-school system, the performance of remaining students will continue to deteriorate. As a result, then what have charter schools done to help improve the overall education level of society? The answer is nothing.

Here's a non-school example to illustrate the point. Think of a container of mixed nuts – walnuts, almonds, cashews, etc. If you grab a handful of nuts, usually you end up with most, if not all, the different type of nuts. When you take a bit you get an interesting mix of flavors. Then, someone goes through the container and eats all of a certain type of nut – say cashews. What's left is a different mix. The next time you grab a handful, all the cashews are missing and the flavor has changed.

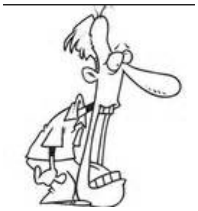
Think of your own example – there are many. The point is the character of the container of nuts is different without the cashews, just as the character of the school is different when a certain type of student transfers to a charter school.

The change in the mix of students is not merely a "so what?" We…again societal we…are creating two classes of students and therefore two classes of citizens – those who seem to learn within a structured system and those who are not inspired or motivated by a more structured education system.

Why should we hold back students who want to learn more? That idea seems incredibly stupid. Therefore we need charter schools!!

The idea of throttling back students who want to learn is incredibly stupid. But there is nothing about the public-school system that prevents students from learning more. Public schools can accommodate those students who want to learn more as well as provide a positive and encouraging environment for those student who are not as inspired.

Assuming that all students learn the same way and at the same pace is foolhardy. That kind of thinking is about as foolhardy as assuming all who play golf are capable of shooting par over 18 holes. What is not foolhardy is ensuring that students are reminded constantly of the opportunity to learn…and encouraged constantly to try to learn.



When the discussion turns to how students learn at different rates, I am reminded of my freshman year in college. My first test of any kind was in accounting. After handing in the exam, I was confident of a very good score. The grade? A solid "D". Oops. Maybe I wasn't so smart after all. Sometime between the first and second test, I had an "ah ha" moment and began to understand the principles of accounting. On the next test and on the final, grades were solid "A's".

Not everyone is lucky enough to have their "ah ha" moment so early in the semester…or even so early in life. Because some "ah ha" moments are later, we need to provide an education environment where everyone is exposed to an opportunity to learn and encouraged to learn.

Charter schools, and magnet schools to an extent, take away from the public schools a substantial portion of the inspiration to learn and the encouragement to learn – not from the students attending the charter schools but from the students not attending. Put someone else's shoes on your feet. After higher-performing students leave for charter schools, who's left in your public school to inspire you to learn?

Teachers are facilitators and ideally mentors. What if you're a student who is more comfortable seeking help from peers before seeking help from teachers? Now, with many student-helpers gone, where do you turn? Or, do you just get discouraged and eventually give up?

The reasons parents and students give for wanting to attend charter schools make perfect sense. What doesn't make sense is why society needs to "destroy" the public school system in order to achieve what the students and parents want. The public school system helped make America the innovation and manufacturing marvel of the world for the last 150 years.

If a portion of society wants to spend more taxpayer dollars and have charter schools, why not leverage the dollars and educate even more students? Inspiration for education is not driven by new buildings, good sports teams and the like. Inspiration for education is driven by desire.

Charter schools create a death spiral for public education, which in turn, leads to increased inequities in society and makes it more difficult for people to move up the economic ladder. And, ignore the rubbish that more public education is some kind of socialism. If you want the democracy to survive, you best have an educated public with a wide-spread belief of reasonable economic opportunity.

The community needs to work together to help create a desire for all students to learn, to explore, to try something new…and even to fail. Yes, failing can be a great lesson as long as failing is framed as a learning experience. Not all students learn at the same pace or learn the same way. But all students can learn. We…societal we…have an obligation to encourage students of all ages to learn more and provide those students a fair venue in which to learn.

#7 Changing Prisoners from Tax Users to Tax Payers

Another aspect of public education that needs more discussion educating people in prison? Why? "Those people" don't deserve it. Just another cockamamie socialist idea. Plus, there are lots of people more deserving than criminals.

All those arguments are true until one looks at the picture another way. Ask yourself these questions:

- As a taxpayer, would you rather have someone else pay taxes and reduce your tax burden or would you rather pay more taxes?
- Would you rather have less crime or pay more taxes for prisons and law enforcement?
- If you want more manufacturing jobs in the US, would you like to have a large pool of skilled workers?

"Yes, yes, yes!," you say, "But I still don't understand why taxpayers should provide a free education to those incarcerated. Just doesn't seem fair."

OK, some aspects might not seem fair. But how many people want to be incarcerated just to get a free education? Maybe, just maybe we…societal we…should also rethink why getting advanced technical training or a college degree is so expensive. (Let's save that discussion for another entry.)

Why educate prisoners? Put societal benefits aside and take a hard look at the financial side – return on investment, ROI. For taxpayers, it is cheaper over time to provide a college education than to incarcerate most prisoners. Keep reading. You'll be shocked at the ROI.

What is the incremental cost of education for prisoners to earn a technical or college degree?

1) Room and board? No, it's already being paid.
2) Most support costs? No, already paid.
3) Incremental funds for sports teams, recruiting students, and the like? No.

What remains then are incremental costs for: (i) instructors who meet standards of an accredited college or university; (ii) remedial training instructors for those prisoners requiring such training; (iii) coursework material; (iv) classroom hardware, much of which could be used for other activities; (v) other miscellaneous expenses, although likely not significant.

As a gauge for comparing cost, let's take the cost of tuition only per year at three state universities: (i) Michigan State, $14,460; (ii) NC State, $6,535: (iii) UC-Davis, $14,463. The average in-state tuition for the three is $11,819 – call it $12,000 (US$2019).

Now, let's assume that 50% of the tuition is allocated to incremental costs outlined previously, On that basis, someone in prison earning a degree in say five (5) years would cost the taxpayer an additional roughly $30,000. ($12,000 x 50% x 5).

What's the ROI for taxpayers? That depends on several factors, including time to be served in prison. Time to be served…and therefore expense to taxpayers for each prisoner…has been increasing. While the average time varies by state, the trend is for longer sentences, with the average sentence having increased roughly five (5) years from 2000 to 2014 (Source). Five years is a reasonable estimate for a prisoner to secure additional technical training or undergraduate degree. Time required could be less since prisoners can likely devote more time to studying. I mean, how much party time is there in prison?

By earning a degree, a prisoner could earn an early release – say one year off the sentence for one year of schooling through an accredited education institution. And why not? Staying in prison after having acquired marketable tech skills or an undergraduate degree is not productive for the prisoner or beneficial to society. Plus, an early release avoids taxpayers footing the bill to house prisoners -- national average of $30,000 per year. In some states the cost for housing prisoners exceeds $60,000 per year.

What's the estimated ROI to taxpayers for a prisoner education program? For prisoners in their 20's and even up to age 30, what's the ROI for taxpayers…without any recognition of reduced cost of law enforcement, reduced court support costs, safer neighborhoods, etc.? The ROI to taxpayers is 700%. For prisoners age 35-40, ROI is 400%.

(I realize there are many variables and one must make numerous assumptions but the results are so striking that the idea seems worth analyzing in more detail. The ROI calculation for this entry is available on an Excel worksheet. (19 03 03 #326 Cost Avoided Educating Prisoners) Feel free to analyze the assumptions and calculations. Keep in mind, as with other entries, the purpose of this blog is to stimulate conversation and more analysis, not create another master's thesis.)

Will some former prisoners commit crimes and return to prison? Of course. But it is hard to argue that society is worse off with fewer prisoners and lower costs for operating prisons. Plus, there would be more people paying taxes.

Will some people commit crimes just to secure a free education? Yes, but so what? This concern indicates why the US needs to restructure its education system to allow all residents an opportunity to have an affordable advanced education.

While educating prisoners might seem more like socialism to many, look at the problem of incarceration from a different angle:

1) US has the highest incarceration rate and cost of incarceration of any developed country. Reducing incarceration rates will reduce taxpayer cost…and crime. Some classes will need to address anger management and why the individual committed the crime(s);
2) In order to maintain competitiveness worldwide, the US needs more skilled workers. The prison system offers a substantial pool of potential skilled workers. For technical skills, the incremental cost of training prisoners is probably less than training workers from the general populace. Prisoners can also produce products while learning. In my undergrad days, virtually all the furniture in the fraternity house was made by prisoners. The furniture wouldn't have won any design awards but it was high quality and withstood severe use;
3) Educating prisoners eliminates the need to build new prisons. By educating prisoners, say 30-35%, and possibly up to 50%, of the existing prisons could be eliminated. The highest cost to taxpayers is not the cost of building the prison facility. The highest cost is compensation for staff to operate the prison. Most of an organization's overhead cost walks in every day on two feet.
4) The net cost of educating prisoners is not really a net cost to taxpayers. Educating prisoners is really a net savings to taxpayers. With a properly structured education program, including managing the underlying cause for incarceration, a substantial portion of prisoners could become taxpayers instead of tax users.

Why don't more members of Congress, especially Republicans, support the idea of educating people in prison? Why do many representatives in legislatures continue to believe putting more people in prison and leaving them uneducated is smart policy?

Beats me. Like many policies from trickle-down economics to denial of climate change, the idea of not supporting education for those incarcerated, especially among Republicans, seems to have no facts to support. Rather the policies seem based more "gut feel" and what plays well with hard-core supporters rather than what's right for the country.

#8 Do For-Profit Universities Help Prepare for Coming Tech Tsunami – Yes, No?

Do for-profit universities help prepare students for the coming technology tsunami? My view? No. First, let's define for-profit universities, or FPU`s. These are institutions with a primary purpose of making a profit for investors. In an FPU, education happens to be the product. The product to generate a profit could just as easily be processing waste – e.g., Waste Management Incorporated – or selling coffee – e.g., Starbucks.

While doubtlessly some FPU's are well-intentioned and focus on educating students, let's not forget the primary purpose of any for-profit company. Duh, sell a product/service, make a profit and return money to investors.

But you ask, "What about private colleges and universities? Aren't they in business to make a profit? I mean, Harvard has a huge endowment -- maybe $10 billion or something?" Harvard's endowment is more like $35-40 billion.

"Alright, lots more endowment than I thought. I'm confused. What's really the difference between Harvard or MIT and say Trump University? Maybe Trump University is a bad example, but what about say University of Phoenix? It's for profit and from what I can tell, University of Phoenix does more public good for lower-income people than either Harvard or MIT. University of Phoenix educates a lot of people who otherwise could not attend college. Your argument against for-profit universities sounds elitist."

Agreed that University of Phoenix seems a lot more affordable than many private educational institutions. But such an argument creates a false equivalency. Realistically, 99.9% of the students attending University of Phoenix could not qualify academically to attend the top-end academic institutions in the US. Not being qualified academically does not mean students at University of Phoenix are dumb; they lack demonstrated skills in key areas.

Maybe the better question about public good is, "When all the costs are taken into account, is there a less costly and more effective alternative to teach basic skills than such places as University of Phoenix?" Let's also be honest about education and skills. Not everyone has the same skills or can even acquire the same skills. My crayon jungle drawing from grammar school might have won 2nd place prize at the county fair, but no amount of training is going to make me a successful professional artist.

From a public good perspective, how can we… the proverbial societal "we"…make sure all students have an opportunity to learn basic skills that will enable them to secure and retain a reasonably well-paying job? While everyone in the US is supposed to have access to free public education through high school, a remarkable percentage of students do not complete high school.

As of 2016, the high school drop-out rate was 25% or more in some states. (When reviewing the data by state, reported graduation rates in some states seems highly inflated, or the standards to graduate in those states are exceedingly low.) Lots of reasons for not finishing, including recognizing that not all students learn at the same rate or the same way. In addition, some families have such limited income that children must work to help support the family as soon as possible, even if it means dropping out of high school.

While the reasons for dropping out vary, should society ask these students to pay to finish their education, especially through for-profit institutions? Asking them to pay a very high price just to finish their high-school education is a disincentive to complete the degree. Plus the cost of attending remedial classes at a for-profit institution creates an excessive financial burden on someone who's likely to be earning low wages and have little or no savings.

Wouldn't society be better off to pay for their education? Paying to complete high school would provide those who didn't finish a better opportunity to secure higher-paying jobs and, with those jobs, pay more taxes for their entire life. Providing an opportunity to complete high school and maybe two years additional education at no cost could likely help reduce crime and the cost of incarceration.

As noted in Entry #7, the estimated cost of incarceration per prisoner per year ranges from roughly $30,000 to $60,000. Based on the cost: benefit analysis in Entry #7, paying for prisoners to secure a technical degree or college degree while incarcerated resulted in a return on investment to taxpayers of 400-700%, and possibly higher.

"OK, I'll buy your logic but what's wrong with using for-profit universities to offer such some education? Besides, the private sector is always more cost-effective than government."

Why use public education rather than private for-profit institutions?

1) No additional facilities required to host classes. The remedial, technical and early college classes could be held in the evening and/or weekends using existing high school, junior college or some government buildings. Virtually all of these buildings are used more during the day and have surplus capacity in the evening and on weekends.
2) Alternative teaching methods in place. Virtually all public school systems have implemented alternative teaching methods, which could be adopted for older students who learn differently.
3) Public education does not add additional financial burden on the student. University of Phoenix, for example, charges about $1,200 per course. For student needing say ten classes to complete high school (equivalent about one year), the cost using the University of Phoenix rate would be at least $12,000. What may be even more of a problem for these students is the course material for what is usually a semester course – say 3-4 months – is crammed into five (5) weeks. Cramming material into five weeks leaves virtually no time for course material to "sink in." Think of drinking out of a fire house. If a student does not fully grasp the idea when presented, the student is immediately behind. For institution like Phoenix, this approach can lead to the same person attending yet again…and another tuition payment.

4) Class content can be tailored to help prepare students to continue their education in community college programs, whether technical training or prep for college.

The question posed in the title of this Entry, "Do for-profit universities help prepare for the coming technology tsunami?" I continue to say, "No, these institutions do not." As frustrated as we sometimes are with the public education system, the system is designed for the public good…and not to generate a profit and provide (some believe maximize) a return to investors.

The US needs to prepare for the oncoming technology tsunami. One key component of preparation is to increase the number of qualified workers. Much like educating prisoners, providing classes/remedial training to those who have not completed high school is in the public interest by increasing at very low-cost, the pool of skilled workers. A larger pool of skilled workers is essential for the US to maintain production of goods and services and remain competitive worldwide.

#9 Public or For-Profit Schools. Which More Cost Effective for Specialized Training?

Entry #8 outlined arguments why society would be better off banning for-profit universities, or FPU's, from charging students for class material that should have been taught as part of their secondary, and in some cases, primary education. Why should students who learn at a different rate, or learn in ways outside the standard teaching method, be penalized and required to "pay twice" for the same classroom material?

OK, but what about course material not taught in public schools? Or course material taught in technical schools? Why burden the taxpayers with such cost? Why not use for-profit universities for such training?

If someone wants to become a licensed cosmetologist, why should the public have to subsidize such training? Same with say someone who wants to become a licensed auto mechanic. Why should the public support such training?

Such an argument is a valid one. At the same time, society needs to consider the role of public education beyond high school. If North Carolina's Central Piedmont Community College (CPCC) is representative, there are numerous classes and training programs aimed at some very narrow occupational fields. In some cases at CPCC, classes are designed for specific types of companies, or even specific companies. Based on a cursory review of CPCC website, students have an opportunity to prepare for licenses, earn certificates, or an Associate degrees in a wide range of occupations. Yet all these classes, including those for the companies, are subsidized by the taxpayer.

Some key benefits to having such specialized classes taught using the public education system include:

1) Control over quality of the course material. There is more oversight over relevancy and quality of course material at accredited universities than at for-profit universities.
2) Ability to integrate other learning material into the course. For example, the courses could include basic class material as well as additional information about how to integrate emerging advanced technology such as artificial intelligence. Having this opportunity to broaden the student's perspective, would help the student understand how to use emerging technologies.
3) Using a community college for specialized training is less costly to the student and to the public. Because the infrastructure and administrative overhead are already in place, the incremental cost to add specialized classes is less at a public university than the cost at a standalone for-profit educational institution. As a result of using public-education facilities, the student can be trained and begin working with fewer outstanding loans and ideally no loans. The reduced financial burden increases the likelihood the student will quickly migrate to becoming a full-time worker and taxpayer.

Some will ask, "Is subsidizing the cost of specialized training yet another aspect of more socialism? Another harebrained giveaway by liberal Democrats?"

Clearly, or maybe not so clearly, there is a point beyond which the public should not pay for specialized education. Such training should be the responsibility of the individual or the company where the individual is employed.

The beginning of the "no-more-subsidized-training" line will vary by geographic area. Community colleges in urban areas will have a different course mix than community colleges in rural areas. I think most everyone can agree that local communities should make that choice of what courses should be subsidized rather than letting the federal or even state government do so.

"Isn't subsidizing specialized education a slippery slope? I mean, should the public be subsidizing someone who wants to learn basket weaving or how to make greeting cards? C'mon. What about those situations? We know someone will push for such classes and then claim discrimination if the classes aren't offered. Why create all the hassle. Let them all go to the for-profit teaching institutions."

The "slippery slope" argument is often cited…and probably occasionally valid. But always justifying not doing something because of a slippery slope would negate most societal norms and laws we have today. Laws and behavioral norms are based on actions of a "reasonable man" (or woman). In many cases there is no clear line between reasonable and unreasonable. Focusing on how the extremes, or outliers, might be affected is a path to stagnation and not a path to progress and Improvement. For those classes or technical programs that fall outside the norm and could be considered unusual or extreme, then maybe a for-profit university or a collection of private tutors is a better choice for such training.

The default, seems to me, whether for general education content or for specialized content, should be through a public institution. If the public education path cannot work, then consider a for-profit institution. Public institutions afford greater opportunity to control content quality and greater opportunity to control cost for the student…and public.

#10 College Admissions Scandal – a Different Perspective

How does the college admissions process fit into the discussion of the US preparing for the coming technology tsunami? The topic seems appropriate for two reasons: (i) as noted in several blog entries, the US needs to increase the percentage of students with either an advanced technical degree or a college degree; (ii) the public discourse about the college admissions process is missing a key component. That overlooked component allows many students to attend certain higher-end academic institutions.

The rhetoric about the college admissions process ratcheted up in March 2019 with a number of articles were published about parents using influence and/or cash to help their children get admitted to various colleges/universities. Some of these activities involved cash bribes and a few high-profile parents charged by the FBI pleaded guilty.

After the FBI charges were made public, many media "talking heads," pundits, not-so-privileged students and others claimed to be outraged by the activities of the parents. "Such practices are unfair!" "What about the students whose place in the college/university was taken by one of the

privileged?" "The admission process needs to be based more on meritocracy!" Some further claimed the admissions process was racist.

Seriously folks? You've been living under a rock if you don't think it's a long-standing practice for parents to leverage connections and to "bribe" the administration to get children into prestigious schools. For decades, academic institutions have tweaked admissions standards for certain students. If parents were willing to say make a healthy donation to the school or there was a long history of family members attending the school, then students were often admitted under somewhat different standards.

I recall in my high-school days learning that the brother of a classmate that I'd known since the first days of grammar school had been admitted to a rather prestigious college. When I asked how he was admitted, my classmate laughed and said "Simple, my dad paid for a new building." Does anyone really think George W. Bush was admitted to Yale, then the Harvard Business School on his own merit? And, hmm, maybe the Donald falls in that same category. Wonder why he insists his transcripts not be released?

However, what seems to be new in this story about privilege is the academic institution getting cut out of benefitting from the bribe. Yale, for example, apparently was unaware their long-term soccer coach was on the take and willing to recruit for the team each year a couple of players who would not be admitted to Yale based on academic merit. If the coach only had given Yale part of the take.

What seems more prevalent than cash bribes, although the practice is not new, is having someone other than the student take the SAT or ACT. What is new in the last decade or so is the parents claiming the student has some type of learning disability, which then allots more time to complete the test. While using "stand-ins" and claiming "learning disability" are unethical, such practices should be fairly easy to stop.

Some who are outraged at a few privileged students skirting the normal admissions process have also claimed that athletes granted scholarships did not skirt the rules because the scholarships were based on merit. Really? Merit for what? Playing basketball? Playing football?

Okay, the individuals might be gifted in a particular sport but how many of these athletes are gifted academically? 5.0%? 10.0% tops. Last I looked, the primary role of a college or university was academics, not athletics. Colleges and universities are accredited based on academic standards, not the success of the football team or the basketball team.

Let's see if I understand how the athlete is admitted based on merit. A student is admitted to say Duke University under a scholarship to play basketball. The first semester the student does not attend class, fails all subjects and is put on academic probation. The terms of the probation state

if the student's GPA doesn't improve in the second semester, he will be ineligible to play basketball, and might be subject to expulsion.

The student continues to play basketball through the second semester – and Duke hopes the NCAA tournament – but like the first semester fails all classes. The penalty? Even if the student-athlete is expelled, what does he care? His goal was never a college degree. His goal was to get drafted by an NBA team. The Duke coaching staff, the University's administration and the student knew from day one he was going to be a "one-and-done." But the student was admitted anyway. And even worse, the Duke basketball coach gets praise and a raise from the Duke administration.

So tell me how the "one-and-done" student-athlete was admitted to Duke based on merit? Merit to help the basketball team but not admitted based on academics. For those claiming such athletes are enrolled based on their merit, while other students are admitted based on privilege and not merit, please stop the hypocrisy. (If you don't think college athletes and coaches are focused on the pros and not college programs, click here.)

A final thought, which no one seems to talk about…and to me is a critical component of the discussion. Admitting a limited number of students from very wealthy families is a benefit to all students at the institution. Why? Go back to my classmate whose parents donated a building as a trade for her brother's admittance. Yes, it was a deal for the privileged. But from a broader perspective, for many years students at the college benefited from the cost of a building not being part of their tuition.

A question we should be asking is, "How many students who otherwise could not afford to attend an Ivy League or other top-line school have benefited from the wealthy contributing to the endowment of the college/university?" Maybe the students who are attending such schools only because of a scholarship should ask themselves, "Would I be able to afford to attend without subsidies from the institution's endowment?" In almost all cases, the answer would be "no." So for the not-so-privileged students, please swallow your pride and be grateful that someone is subsidizing your education.

Thus, from my perspective, the so-called "admissions scandal" for the privileged has two very different sides. First, no question that illegal bribes are out-of-bounds and should be prosecuted. However, those who claim using a back-door or side-door route to admission is unfair need to be careful about wanting to make the admissions process the same for everyone. Instead, take a deep breath, step back and be thankful for donors who help build buildings and who donate generously to the endowment that allows more students to attend a college or university they otherwise could not afford and be thankful the privileged are helping the US to prepare more effectively for the on-coming technology tsunami.

#11 Is Diversity a Key Component of Preparing for the Technology Tsunami?

Part of preparing for the technology tsunami is understanding and appreciating how people in other countries/cultures think, behave, and interact with others. Developing this understanding will help prepare the US for responding to attempts by other countries to use technology against us in the future.

As technology has evolved from sailing ships to ocean liners to airplanes to communications via satellite, the world has become smaller. Earlier this week, I was reminded how small the world has become with advances in technology. A chain of communications started when I emailed a business colleague, congratulating her on more than 20 years operating a consulting firm.

Her response, which I received the next morning, thanked me for the note…and also indicated she was responding from a hut in the middle of the Amazon rainforest. A couple of back-and-forth emails explained she had access to some solar power and a slow-speed satellite link. The link was fast enough to allow sending a picture of a rather large tarantula meandering on the deck surrounding her hut.

While my business colleague was experiencing diversity in the Amazon rainforest by working with indigenous people, what about experiencing diversity at home – in the city where you live? In your neighborhood? And does experiencing diversity even matter? Well, yes, I think diversity does matter if the US is to develop an effective strategy to capitalize on the coming technology tsunami rather than being overwhelmed by the technology tsunami.

A key component of preparing for the technology tsunami is education…and education for all age cohorts. Part of that education includes learning about and really understanding other cultures. Ideally that understanding is gained on the ground in the local country. Unlike my business colleague, few families, however, can afford to travel worldwide and experience these cultures firsthand. What's an alternative? A great way to start is trying to understand cultures in your immediate locale. Most urban areas in the US have pockets of different ethnic groups and cultures.

What happens when your locale is not diverse? When everyone in your locale looks and speaks the same? Does the lack of diversity really matter? Homogeneity may be comforting but it runs the risk of stifling creativity. Homogeneity is also a breeding ground for "group think." Make no mistake, overcoming the threats of technology tsunami will require significant creativity.

Recently my wife and I visited some longtime friends who moved to a well-known retirement community in Florida. Their house is lovely, and in the larger community the grounds well-maintained and almost every shopping need and service is nearby. Our host jokingly referred to the development as a "reservation." He also noted liking to stay on the reservation and avoiding the real world, which he considered not always pleasant.

Another friend, whom we met for coffee, had lived and worked on the "reservation" but later moved to a nearby location. He noted how virtually every aspect of life in the retirement community was managed, including hiring doctors in the clinics who fit a "Marcus Welby" profile.

During our stay, which included golf, multiple restaurants, shopping and extensive travel by golf cart, neither of us saw any blacks, Hispanics or members of virtually any non-western European ethnic group. Only one member of a golf group that I was in, which included several foursomes, was Asian.

So, back to the question – "Does diversity really matter in preparing for the technology tsunami?" Does living in a sanitized bubble really matter, especially for people who are retired? Do the retirees really care about the coming technology tsunami? And does the rest of society care what retirees think?

My vote – living in a sanitized bubble is not good for society, even for retirees. Most retirees living in the bubble have children and grandchildren. Why Gramps may be technology challenged and/or a curmudgeon, Gramps still has some influence on the grandchildren. And Gramps still votes. And we know Gramps mostly watches Fox News, which seemed to be the channel of choice virtually everywhere we went on the reservation.

The technology tsunami will be a major threat to Gramp's children and grandchildren. Without an effective US response, sustained economic growth will become nearly impossible. To create an economy that can capitalize on the technology tsunami…and not be overrun by it…will require a range of thinking from people of different cultures.

If you don't believe diversity and creativity are linked, take a look at the mix of faculty and students at say the Media Lab at MIT. Then take a close look at the range of highly innovative ideas and products emerging from the lab. Living in a bubble, whether physically or politically, lessens the opportunity for creative thinking.

Diversity can be accomplished a number of different ways. Ideally, diversity evolves on its own without any intervention. For example, in the eight houses in our neighborhood that I pass on the way to get coffee, there are families from at least four countries. And the eight houses include families practicing at least five different religions. An even more diverse population exists in the apartments that I pass closer to the coffee shop. That cultural/religious mix happened on its own.

Forcing such a diverse mix is problematic and smacks of too much government intervention. However we…societal we…can Implement policies that encourage more diversity and we can also prohibit policies that intentionally discourage diversity.

What about policies that encourage diversity in schools? How should diversity in schools accomplished? A seemingly obvious solution is busing. While busing might make create a diverse classroom, busing has many negatives, including excessive cost and excessive travel time for many students. Another downside of busing not often discussed is the risk that businesses may decide not to locate in a school district where busing is mandated. The longer-term effect of not attracting businesses and staff is a lower tax base and slower economic growth for the school district.

A policy that discourages diversity is charter schools. North Carolina is an example of this strategy, although not necessarily representative of all states with charter schools.

In North Carolina, charter schools: (i) receive taxpayer funding; (ii) select students, although the charter schools claim admission is open to all who "qualify"; (iii) are not subject to the same rules and/or oversight as public schools. Recently, the North Carolina legislature passed a law requiring all teachers in North Carolina to secure a North Carolina license. Teachers licensed to teach in other states still need to pass the North Carolina test because the test in another state "might not be as rigorous" as in North Carolina.

All teachers…oops all teachers except those in charter schools…are subject to the license requirement. Thus, any teacher relocating to North Carolina is effectively incentivized to avoid the hassle of getting a NC teachers license required for a public school and instead, teach at a charter school. In addition to not needing a license, teacher pay at a charter school is not subject to the same guidelines as at a public school.

The continued negative policies of the North Carolina legislature to erode the value of public education is one of the reasons I wrote Entries #5 and #6, which outline why banning charter schools is a necessary component of preparing for the technology tsunami. Still, banning charter schools still does not solve the diversity issue. And busing kids to create diversity has too far many negatives.

What's the solution to more diversity in schools and society? Economics and attitude.

#12 Solution to Diversity? Economics, Not Gov't Intervention.

Diversity seems best accomplished on its own. As noted in Entry #11, our neighbors, within a stone's throw or two, include families from at least four countries. Within this group, there are at least five religions. All that in a suburban environment.

How did such diversity occur? With government intervention? With housing subsidies? "No" to both questions. The diversity evolved from economics…and attitude.

Granted our neighborhood is a bit more affluent than most but affluence may result in less, rather than more diversity. In Entry #11, I also described observations from a 5-day visit to a well-known retirement community in Florida. When leaving the community, my wife and I both remarked we had seen no blacks, no Hispanics -- yes, this was Florida -- one Asian, and no one from the Middle East. We also both commented while we had a lovely time visiting our friends, we wouldn't want to live there.

So what strategy can help stimulate diversity? Throughout the technology tsunami series I've stressed education as a key. Education opens the mind to new ideas, both academic and societal. And for the vast majority of people, education also provides a chance to improve economic status.

Education for this discussion consists of four major stages, or chunks:

1) Primary education -- i.e., "readin', writin' and 'rithmatic" -- and some social skills
2) Secondary education -- middle school and high school
3) University or Advanced Technical Training
4) Continuing education – following initial employment and continuing throughout one's career

For primary and secondary education, the public has consistently supported taxpayer funding. While some changes to the primary and secondary curriculum might be required for the technology tsunami, the key to preparing for the coming technology tsunami seems to lie in Stage 3 -- College, Advanced Technical Training -- and Stage 4 -- on-going training once in the workforce.

Currently, only a small percentage of the population can afford securing a college degree or advanced technical training certificate without financial assistance. Even with scholarships or reduced tuition, many students need loans. Terms of these loans are often onerous, saddling graduates with years of debt, which in turn reduce their opportunity to save for buying a house and/or to start saving for their children's education. (For more about the problems with people paying off loans, or thinking they have paid off loans, see 19 04 13 Student Loan Repayment Issues and Problems)

Maybe the solution to the how-to-finance-advanced-education conundrum is easier than we think. Why not take the same approach to financing education that seems to work well for medical coverage in all industrialized countries…other than the US (so far). Allow students to attend a home-state university at little or no charge for a specified period -- say five (5) years. Extend the no-charge time period if a student works.

Like universal health care, offer a "private," additional-cost option. Under this option, students could attend an out-of-state university or private college/university. Tuition and other costs would be set by the institution. The private institution could still offer financial aid to students.

Technical trade schools could have the same option. Attend state-run technical schools at no charge with the option to attend private-technical or trade schools.

Technical/trade schools would need to meet one hurdle not currently required -- accreditation. Accreditation would sharply reduce considerable fraud among private technical/trade schools -- Trump University being but one example. The accreditation process would be similar to that used for academic institutions.

And please don't view subjecting the trade/technical schools to accreditation as government overreach. Educational institutions need some form of regulation. A market-based system will not work because, by the time the student understands the school is not providing adequate education, the student has wasted several years and is saddled with significant debt.

What about people who do not want additional education or who are not mentally capable? We're not living in Lake Woebegone where all students are above-average.

A portion of the student population will not pursue additional education and a percentage of those will not even graduate from high school. While some low-skill jobs likely will continue to exist, people in those jobs should earn a minimum wage that allows them to live above the poverty line.

Policies to address this lower-education group are separate from policies to prepare the US society for the coming technology tsunami. The goal of the "tsunami series" is to outline approaches that will increase significantly the percentage of the population that is skilled adequately to thrive in a technology-based economy.

What about the education outlined in Stage 4? Ongoing education seems to be in a black hole

where: (i) there is no existing infrastructure supporting such education…and none planned; (ii) no one in state or Federal government seems to be responsible for on-going education; (iii) there is no coordinated effort by private industry and/or trade groups. Policies for on-going education seem to have evolved from

the Abbott and Costello routine of "Who's on First?" Just who's in charge of continuing education?

Logically you'd think private companies would want to maintain an educated workforce. But because of lack of restrictions or penalties re relocation, many US companies operate as if they have no responsibility to spend money to provide continuing education to their workforce. When the workforce skills become dated, a company, with little or no penalty, can close shop and move to another location. The new location will be selected based on which state or city is offering the most incentives, including training the new workforce.

Taxpayers at both ends – the location where the company left and the new location – get stiffed while the company management and shareholders benefit. (For more about the impact of how companies can adversely affect a community, and not suffer any consequences, see Entry #86, "Is North Carolina a Stealin' State?" and Entry #87. There are several other entries as well that address similar issues.)

As far as addressing the issues of ongoing education, that deserves a separate entry – #13.

Note: within hours of publishing the original blog entry, we received the 04/14/2019 edition of the Charlotte Observer. A front-page article discussed whether eliminating certain zoning restrictions -- banning single-family zoning, e.g. -- would help stimulate diversity. My short answer is "No." Tweaking zoning regulations for single-families is different than wholesale banning, which is likely to have major negative consequences for attracting higher-income families to remain in the city limits. Link to article, 19 04 14 CLT Observer re Zoning Changes for Diversity.

#13 Preparing for the Technology Tsunami: On-Going Education

The need for on-going education and training of workers is nothing new. Who's been responsible in the past for such training? Until about the mid-1990's or early 2000's, the employing organization seemed to be the principal source of on-going training.

In some cases, employee training was done on the organization's premises; in other cases, employees were encouraged to attend classes outside. Expenses for such classes usually were reimbursed by the organization. Based on my experience, mostly in manufacturing-based companies, the training seemed to focus on procedures and systems unique to that company.

What has changed within the companies in the last 20-25 years is how machines and support equipment operate. There is ever-growing integration of software programs to help manage all aspects of machine operation, movement of material and the flow of information.

While some features of the software programs might be unique to the organization, the fundamental components of a given software program, or suite of programs, are the same and an example of AI being implemented in the workplace. Understanding the fundamentals of software programs has created two classes of workers:

1) A group, generally younger, who are now more mobile. Because these workers understand the fundamentals of software, they can carry that knowledge to another organization and not face as steep learning curve, thereby contributing more quickly than workers in the past;
2) A group, generally older, who were trained in the organization's approach before many software programs were integrated into daily operations. These workers become far less mobile and, despite their experience, less valuable to the existing organization. The "reduced-value" phenomenon applies to both blue-collar and white-collar workers. Unfortunately, some of these "reduced-value" workers have 25 to 30 years remaining before retirement. This group will be the most negatively affected by the technology tsunami.

What does society do with existing "reduced-value" workers…and ideally implement plans to minimize the number of such workers in the future? Back to school! But, can you really teach an old dog, or a middle-age dog, new tricks?

The stumbling block for many of these workers seems to be never having learned basic math. While one does not need to know calculus to understand how to use computer programs effectively, one does need to know basic algebra. Programs are basically built are conditional statements – if A, then B, etc. Understanding the approach applies not only to Excel-type programs but most processing-type programs as well.

What about people who just don't "get" math, even basic addition and subtraction taught in grammar school? Obviously, not everyone learns the same way and not everyone is skilled at every subject. However, my guess is at least half the people who claim "not to get math" would "get it" if math were taught in a way more understandable to them.

Without having completed any formal research, I'll bet there are at least three approaches used to teaching math. And one of those approaches probably will work on most people. So, for the "I-don't-get-math" group, let's take away the stigma of not understanding the traditional approach to teaching math, and try using the other approaches. Just visualize the smiles on faces when "I-don't-get-math" students move to the "I-get-math" category.

Will all these students become math wizards? No, but once the basics are understood, we…societal we…might be shocked at how many in this group progress to basic algebra, and beyond.

What about people who despite different approaches to teaching, never “get” math? How do we prepare them for the tech tsunami? Or, what if someone just doesn't want to learn?

A certain percentage of people won't learn, and the consequences are the same whether one is unable to learn or chooses not to learn. The consequences in all likelihood will be a lower-paying service-type job. For those who try, but can't learn, unfortunately the consequence are the same.

Any time society has been disrupted by technology -- printing presses replacing scribes, machinery replacing farm hands, robots replacing assembly workers…and other examples – some people are left behind economically. While a society-funded safety net can provide some assistance, a large percentage of people in this category will fall several rungs on the economic ladder.

OK, you say, I’ll buy the argument that we should be training more workers for the tech tsunami. But who should pay for the training, much of which seems to be remedial? Why should taxpayers pay for the bill and let the companies off the hook? Shouldn’t companies that are laying off workers have an obligation to retrain these workers?

If one looks at other countries for guidance, many industrialized countries, especially in Europe, have laws that penalize, or even prevent companies from relocating or arbitrarily dismissing employees. The US has no such laws. As a result, companies are not penalized for relocating and leaving behind infrastructure installed specifically to help the company and/or leaving behind a loyal workforce with some skills that need updating.

In many states, North Carolina and South Carolina are but two examples, “economic development” is defined primarily as enticing other companies to relocate operations from the Midwest or Northeast to North Carolina or South Carolina. Incentives thrown at companies to relocate border on the ridiculous, but almost always include taxpayer-funded training for employees.

Yet the same “economic development” efforts often ignore, or even discourage, albeit possibly inadvertently, entrepreneurs from starting companies or offer no meaningful incentives to smaller company businesses trying to expand. If any incentives are offered to entrepreneurs, the “incentives” often consist of an “opportunity” to locate in some rehabbed building at a lower rent. While the reduced rent is nice public-relations strategy for politicians, most start-up businesses are starved for capital and capable key executives.

In the near-term, laws preventing companies from relocating and/or laws preventing states or cities from offering incentives for relocation are not likely to be implemented. Even if passed, there likely would be a drawn-out court challenge. A more effective approach to encourage existing companies to stay put might be to help the company analyze costs and determine if updating skills of employees and implementing other cost-reduction systems might be more effective than relocating, especially relocating operations outside the US.

Encouraging companies to stay put and retrain workers gain momentum in the next few years, especially as the technology tsunami becomes more apparent. While the US 2020 presidential election is 18 months away (as of the blog entry publication date), many Democratic candidates seem to be discussing how to help rebuild the American middle class by leveraging new technology rather than the Trump approach of propping up industries on the decline – coal, e.g.

Programs to help update skills of existing workers could be very "hands-on," akin to how many infrastructure projects were initiated in the 1930's under New Deal WPA. Such national WPA-like programs are even more likely after the technology tsunami hits and/or after the country experiences the Revenge Revolution.

Programs to help mitigate the technology tsunami, programs to implement the evolving Green New Deal and other such ideas present a great opportunity for the US to create sustained economic growth. Sustained economic growth, however, can only be achieved with a high labor-force participation rate…and a high participation rate in a technology-tsunami world can be achieved only with an educated workforce.

#14 Could a Change in Semantics Break the Ideologue Logjam?

Arguments against society-wide programs – healthcare, education, climate change – claim that such programs are too expensive. Taxpayers cannot afford these programs. There is a kernel of truth to that claim. Such programs have considerable start-up costs and the payback is often a few years out. Sometimes the payback is a decade or two later.

Of course, the idea of having delayed payback does not apply when the same "too expensive" group decides to make business or personal Investments. Nor does the logic apply when this group is evaluating the performance of coaches for favorite college or professional sports teams. Why coaches? Surely everyone knows it takes time to build a solid sports team. Give the coach at least five years to perform and demonstrate his or her worth.

More seriously, the question is, "Is society willing to take the risk of not investing in programs that will have a sustained, if delayed, return on investment? As an example of a similar personal-level decision is whether to delay needed maintenance on your house or car. Delaying can result

in some immediate cash savings. However, the decision to delay is a two-edge sword. The repairs are needed and by waiting the severity and cost of repairs likely will be much higher. While delaying maintenance may seem to be a savings in the short-term, the decision to delay is not really savings at all, but additional cost. To paraphrase an old tv commercial, pay me now or pay me more later.

How does “pay me now or pay me more later” apply to the education of people who will be displaced by the technology tsunami? Let's say the cost of educating those displaced averages $25,000 per person, roughly equal to 2 years cost of tuition, books and fees at a community college and even some state universities. In addition to the cost of education, let’s assume those being retrained receive a salary of about $50,000 per year. For the two years, the total cost for retraining would be about $125,000 per person.

The $125,000 cost per person seems extraordinarily high until one calculates the cost of not retraining. What is the cost not to retrain?

Assume the median age of the person being retrained is 45 years old, which means the person has 20 to 25 years left before retirement. Without retraining for the post technology-tsunami world, the person may be unemployable, and therefore, receive assistance for the next 25 years of his or her working career. In addition, the person would receive some form of assistance for another 10 to 15 years after reaching retirement age. Total time not working and receiving assistance…and not paying taxes? A total of 35-40 years.

If the person receives just $10,000 per year assistance, which is on the very low side, the cost of assistance for a person previously employed, but now displaced, would be at least $400,000. Thus, the cost of not retraining is more than 3x the cost of 2-year training – tuition, fees, books and salary of $50,000 per year. Oops, we’re not finished. The person on assistance and not employed, would also not pay income taxes as well no withholding for FICA and no withholding for Medicare.

So which is smarter? Pay now to retrain the person displaced by the technology tsunami or pay more than 3x as much later (constant dollars) to have the person on assistance his or her entire life and never again paying income taxes or contributing to the cost of Social Security or Medicare?

The ROI to retrain workers is positive for workers in their 50's and even early 60's when all the costs are included. (OK, the guy at the left is too old but you get the idea.) In addition to society saving money by retraining workers, having an employed workforce with more disposable income will increase consumer consumption, increase overall GDP and with some tweaks, to the tax structure, increase family wealth.

Despite the obvious benefits, for some reason "return on investment" does not yet seem to be part of most discussions about broad social programs, whether the discussion in Washington or in many state capitals. I am always personally baffled why Republicans focus on immediate cost and ignore "return on investment" logic for social programs, yet use the very same ROI logic for personal and/or business investment decisions. Guys, voters are not completely stupid. ROI is a concept that voters can understand.

To break the ideologue logjam, maybe such programs need to be positioned with Republicans as "business Investments" and not "social programs." To mollify Republican critics of these programs, maybe recipients of the proposed technology-tsunami education program should be required to pay a minimum tax of say 1.0% of gross income per year for up to 10 years following completion of the retraining. The minimum tax would allow Republicans to claim assistance recipients have some "skin in the game."

Democrats would do well to position technology-tsunami retraining, the Green New Deal, Medicare for all and other ideas, not as social programs, and especially not as "socialist programs," but position as Investments that will help increase US GDP. Democrats should also agree that every wage-earner has to pay some income tax, even if it's only $100 per year.

Some of the changes in positioning are more semantic than substantive. However, the changes could allow Republicans and Democrats to claim some type of victory and begin to work more closely together. The changes would also thwart some of the statements by conservative talking heads implying that about half the population pays no tax. These talking heads only state "income tax" and make no mention of people paying sales tax, property taxes, fees and many other related taxes. (FYI, the percentage of income paid for all types of taxes is remarkably flat by quartile.)

Will the rhetoric change and Republicans and Democrats begin working together soon – at least agree to retrain workers to be displaced by the technology tsunami? Maybe start working together before the Revenge Revolution? As long as Trump is controlling the Republican Party, there is no hope. Republicans have demonstrated repeatedly a willingness to prostitute themselves for whatever the Donald demands, however contrary those demands are to long-held Republican principles.

Democrats, however, have a great opportunity for 2020 to begin repositioning arguments that many so-called “socialist programs” are really business Investments with positive ROI.

Should we be hopeful? Let’s see what happens.

#15 Policies to Address Tech Tsunami. Socialism? No. National Security.

This entry is a "wrap" to the technology tsunami series, at least for a while. The format for this entry is conversational. The character, Sandy (comments in quotes) is an ardent Trump and NRA supporter who has appeared in previous entries. Like virtually all the characters that appear in this blog, Sandy is patterned after someone I know with very similar characteristics. The entire technology tsunami series, including this entry is available as an eBook. (Click for download.)

Sandy: “I don't buy all this BS that some so-called technology tsunami could wreck the US economy. Stuff like that only happens in socialist countries. Look at what happened in Venezuela.”

True that Venezuela was the richest country in South America and then tanked economically. The reason they went into free fall was not because of socialism but because of bad economic policies.

"Hold on Bubba. I'm telling you those kind of economic problems are what happens to all socialist countries. If you don't believe me look at what happened to the economies of Cuba and to Russia. You know I'm right. Admit it.”

You are right that Cuba and Russia have suffered economically. But in the most diplomatic terms, you’re wrong about why. Let's not confuse communism, which is more political, with socialism, which is more related to economic policy.

“Communism, socialism. They're the same thing to me. I know one thing for sure. You can't have all those socialist policies and still have a democracy.”

Like I said, let's not confuse socialism and communism. There are many countries you might label as being socialist that are democracies. All the Nordic countries, for example, have many government-controlled social programs. Other countries in Europe, including Germany, have some degree of what you're labeling as socialism. Even Canada. Yet, all those countries are democracies.

“Well, what about Greece? They had all those government programs and they went under. Italy almost went under. Call them what you want. I’m telling you government programs are what causes these countries to go under.”

OK, then let's add one more country to the list of countries that almost went under. In fact, this country has come close to going under twice in the last hundred years. Want to guess which country?

“Probably a trick question. Who?”

The United States. We came within a hair's breadth of the economy going into free fall in 1932 and 2008.

“I’ll tell you why. Because of the Democrats. They’re the problem. Democrats FDR and Obama were coming into office when the economy tanked. Democrats are always the problem.”

Could you please put away the Sean Hannity/Rush Limbaugh drivel and look at this issue objectively. Bad government policies under the Hoover and Bush 43 administrations created most of the problems. Notice that I said most of the problems, not all. If you want to later, we can discuss which economic policies were the primary causes. But for now, my point is without sound government policies to counteract the coming technology tsunami, the country is likely to be faced with another economic crisis.

“When you say crisis, are you suggesting unemployment could shoot up to 20 to 25% and real wages fall, just like during the Great Depression?”

Yes. If you don’t think technology can have a devastating impact, look at what's happened to companies and employment in industries where disruptive technology was introduced.

“You mean like the coal industry? I hate to laugh but I understand even the Coal Mining Museum gets some electricity from solar panels on its roof. Anyway, technology and economics have killed the industry. Unemployment in the coal industry is what, maybe only 40-50% of what it was just 25-30 years ago?”

Now you understand why strategic planning and good government policy are so important? I hope you also have some appreciation of the risk associated with bad government policy. Bad policy presents a real risk to the US economy and the country's future as a democracy.

“Gee, I never looked at government policy quite that way. The real impact of government is not whether Democrats or Republicans are in power. The real impact is whether government makes policies that can sustain the well-being of the country. And, you know what? Overturning Roe v. Wade seems far less important than these other issues.”

Sandy, I'm proud of you. If more people had your attitude, the country could start to make real progress in implementing policies to counteract the coming tech tsunami.

"I think I get it. What you're suggesting is not just more government intervention, but government intervention to avoid an economic catastrophe. Really, the need to address the coming tech tsunami is more a national security issue."

Now, if only the Trump Administration and some key people in Congress would "get it" like Sandy.

#16 Supplement: The Human Toll of the Coming Technology Tsunami – Example, Lordstown, OH Plant

The impact of the technology tsunami can easily be viewed as an abstract concept, especially if one is not affected directly. For example, you read an article about technology replacing someone's job. Then the person replaced finds another job, which is fairly easy in today's labor market. Reader thinks, "What's the net effect on the person whose original job was replaced by technology? Zero. What's the net effect on the unemployment rate? Zero. Time to move on to the next article."

But, hold on, there's more to this story. What prompted this blog entry was an article in the New York Times about a family whose members had worked at the GM Lordstown, OH plant almost from the opening day of the facility.

The Lordstown plant was built in the mid-1960s, but over the years GM continued to invest and upgrade the facility. What resulted from investments in Lordstown and other plants throughout North America was increased potential capacity with lower labor content per car/truck produced. Thus, more output with fewer employees. (As I wrote in late 2018, although I had no first-hand information, based on my experience inside GM, closing Lordstown, and other plants in North America, seemed justified.)

What happens to workers when a GM plant closes? Depending upon an individual's seniority and the number of jobs available at other facilities, some laid-off employees might be eligible to transfer to another GM plant. Some laid-off workers at Lordstown met the criteria and have transferred.

What about workers who aren't eligible to transfer or who don't want to transfer, which often involves relocation? Some training is available for other types of jobs, which are usually non-automotive and often at lower pay. In addition, some laid-off workers, again depending upon seniority, receive from GM supplemental unemployment benefits for a limited period.

Back to the family featured in the NYT article. If you haven't read the article, it's worth a read. (19 05 28 NYT Lordstown Shutdown Employee Impact) The short version is the father gets out of the military, goes to work at the Lordstown plant soon after it opens. Over time the father becomes a representative of the union. The son, born after the father starts at Lordstown, doesn't study much in school but is confident he will get a job at the plant, primarily because of his father's position with the union.

After completing high school, the son is hired and one of his jobs is prepping cars before final painting. Painting is an areas where the auto industry has installed as much technology as possible over the years to improve the quality and consistency of the finish. The implementation of technology in the paint shop has dramatically reduced employment. At Lordstown plant the number of employees declined from 38 to 4, a decrease of almost 90%. While the decrease in employment in the paint shop is at the high-end, substantial declines in employment from technology have affected body welding, engine machining and other high-precision areas with high labor content.
At the time of closing, the son had worked at Lordstown for 25 years. While no specific age was cited in the article, the son is probably in his mid to late 40s. With his years of service, he'll be eligible for a modest pension from GM. However, he has at least 20-25 years left before being eligible for Social Security and Medicare.

Where does the son find another middle-class paying job given his limited education and skill level? Another job in the auto industry unless he relocates to another GM plant. Even if he finds an auto job, he runs a high risk of losing it given the continuous implementation of labor-saving technology by the auto companies and suppliers.
The extent of how many jobs in the auto industries (and other industries) are being eliminated by tech goes far beyond the assembly plant, which most people think of.

In an earlier blog entry I mentioned an auto supplier in Fort Wayne, IN that bends tubing to make exhaust systems for cars and trucks for many auto OEM's. If you don't think there are lots of twists and turns in your vehicle's exhaust system, next time you see a car or truck up on a service rack, go take a look underneath.

The process of bending tubing might seem straightforward (no pun intended) until one thinks about what happens when a tube is bent. The metal on the "outside" of the bend becomes thinner and the metal on the "inside" of the bend wants to "crinkle." Bending tubing can be much more complicated than it first appears.

The company that bends the tubes is a perfect example of the impact on employment of the coming technology tsunami. The company incorporates an extraordinary amount of high technology, with a plethora of very sophisticated machines…and very few people staffing those machines. The parking lot of the company is the tell-tale sign of the technology tsunami. The company operates 24x7 with significant daily output, yet has a small parking lot that even during the day when office staff is working, has plenty of empty parking spaces for visitors.

Is this just a story about how one family was affected by a GM plant closing or are there broader implications? If the attitude of the now unemployed son is at all representative, then US society has a growing problem. While the son apparently has not yet come to grips with the long-term implications of the layoff, he is searching for answers to "Why is this happening to me?" "Why, after 25 years of working at this facility, am I getting screwed?"

He's very frustrated and believes that people in Washington "just don't get it." The frustration includes Trump, whom he voted for in 2016, and members of both parties. He's also frustrated with large corporations, which he thinks suffer no penalty for shuttering plants and relocating operations to say Mexico.

The frustration and anger of the son is understandable. While from a business perspective I think GM is more than justified in closing the Lordstown plant, especially given some of labor problems over the years, the business justification does not eliminate the economic and social issues facing the laid-off workers.

We, as I keep suggesting is the proverbial societal we, need to help this family transition from pissed-off members of society to being productive workers in an ever-increasing technology-laden workplace. As it stands now, even with a small pension and some additional benefits, the son is the kind of guy who is ripe to be part of a Revenge Revolution. For those not familiar with northern Ohio, almost guaranteed he's got a deer rifle or two and a bunch of ammo. Now, he's out of a job, has shrinking income, thinks politicians don't understand the problem, and thinks large corporations are exploiting people and communities. Not a good combination.

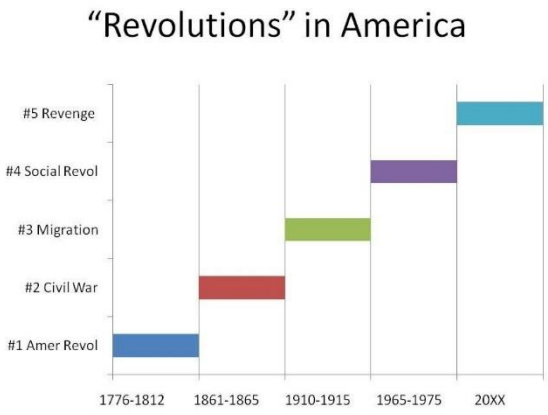
Without some serious societal effort, the ranks of this group are going to grow. Making America great again does not involve trying to reintroduce high-labor content products or industries from decades past. The implementation of technology to replace humans is going to continue. All types of jobs and skill levels will be affected, from manufacturing to legal to medical. Without a national plan to begin lifetime education for people of all ages, from 6 to 66 (and older), the US is going to face a growing segment of the population which is extremely angry and poses a growing threat to a stable democracy.

Appendix A: About the Blog and the Author

(Fall 2013) Why this blog? For many years people have told me my strengths are: (i) making accurate predictions about social and economic issues long before others (ii) offering practical solutions to complex problems (iii) teaching effectively.

As the title of the blog notes, I believe the United States is headed for another revolution, probably after CY2020. As a country we seem to have a revolution about every 50 years. Here's my count:

1. Revolution against British rule, which did not end until the War of 1812
2. Internal revolution, or Civil War, 1861-1865
3. Industrial revolution – say 1910-1917 – combination of influx of immigrants and migration from farms to cities
4. Rights revolution – civil rights, women's rights, environmental rights occurred late 1960's, early 1970's
5. Fifth revolution, which I have labeled the 'Revenge Revolution,' which is what this blog is all about.



While I believe a revolution of sorts is inevitable, how we as a country manage the revolution will determine the amount of violence and bloodshed. The blog is designed to lay out what I think are the issues, explain in what I hope are understandable terms, and then offer practical solutions.

Many issues and solutions are woven into a story. We all seem to learn more effectively with stories. I hope you find these stories interesting and helpful in understanding topics and proposed solutions. Doubtless you will not agree with all the proposed solutions…but at least you will have been presented another perspective.

Some of the stories seem more personal in nature and less about policy. I am including these segments because we are all products of our environment. We cannot divorce completely professional lives from our personal lives and background.

If you have a political bent leaning strongly left or right, you're likely to be disappointed in some of the proposed solutions. The goal is to present problems and solutions in an understandable way. Some solutions might lean more right; others might lean more left. I'm not keeping score about which side has more solutions. I hope you don't try to keep score either.

If you are a stickler for details, then read no farther. I've done my homework and the data are sound enough. If you want to nitpick, OK. But you'll be missing the point. Listen to people making policy decisions in the United States. Whether voters or elected officials, few grasp the basics of an issue, let alone the details. The real world operates using less than perfect information.

I also decided the character in the story should be an assumed name. Why? To provide more freedom to address issues without the reader immediately assuming some sort of bias on my part.

The pen name "Jordan Abel" evolved one day. I also decided that certain topics were described more effectively as a story. Like most authors, I suppose, the names and traits of characters are based in part on people one knows. If you are a friend and recognize yourself, don't take the character too seriously. Besides, even the seeming "bad guys" in this blog have some positive traits. Keep reading, you'll turn out OK...and I will deny to everyone else that you are the model for the character.

Where is the blog going? I don't know. I intend to keep writing. National politics and personal issues provide an endless source of material. I also hope that my prediction about an armed revolution in the US is exaggerated. However, from everything that is happening in the US, I think a revolution is inevitable.

If no one reads the blog, that's OK. Just starting the blog and the writing has been great fun...and at times cathartic. If you are a reader, I hope you enjoy it and I hope, on occasion, to provoke you to think about issues a bit differently. Thanks for your time. John R. Dabels for Jordan Abel.

Appendix B: Difficulty in Adopting New Technology

Adopting new technology is very difficult. The difficulty applies to both companies and countries.

Following are two books written several years ago that address the problem. Doubtless there are other books as well.

- Utterback, James M., *Mastering the Dynamics of Innovation*, Harvard Business School Press
- Christensen, Clayton, *The Innovator's Dilemma*, Harper Business

The short version of the findings of the two books is this. Based on analyzing more than 100 years of data of US companies in industries were a disruptive technology was introduced, a tiny fraction of companies which enjoyed a reasonable market share of sales of the existing technology were able to achieve a reasonable share of sales of the disruptive technology. Companies that did not adapt, and even many companies that developed some products with the new technology, went out of business, some out of business remarkably quickly.

Why the problem migrating to the new technology? When a company is built around a given technology, the company hires people who understand that technology and develops products and a culture based on the technology. When a truly disruptive technology comes along, the company has a hard time letting go of what made the company successful.

As issue when looking ahead is understanding just what constitutes a new, disruptive technology. Like the tsunami wave, waiting until the technology clearly becomes disruptive is too late. Game's over at that point.

A current example is electric vehicles (EV's). Are EV's really a disruptive technology? Yes, part of the powertrain of a car or truck is different – an electric motor versus an internal-combustion engine – but most of the rest of the car/truck remains the same.

While the traditional auto companies have been cautious about developing and introducing a wide range of EV's, EV start-up companies have learned that to survive they needed to adopt many design and manufacturing techniques used by traditio9nal auto companies.

As I hope is clear from the entries in booklet, trying to select and bet the future on which technology will become disruptive is less important than being able to understand and analyze how a technology might be implemented and affect society, and then plan accordingly.