AI – The New Frontier, or IS IT?

I must admit upfront that I cannot consider myself a profound expert in Artificial Intelligence. However, I do have a significant amount of experience over the years in the understanding and application of major technological advancements, including AI.

Early in my career, both at the executive and at the execution level, I was involved with IBM and others trying to determine possible opportunities for the use of what would be consider rudimentary AI.

In one case, I saw the opportunity to use AI to greatly improve the efficiency of cutting leather for the automotive industry. This is a very complex task in that an automotive seat of finished leather is composed of multiple sizes and shapes of cutout leather patterns all sewn together. Each of these patterns had a unique cutting die that an individual would place on a finished hide of leather. All these dies would then be punched out into the final pieces of cut patterns.

Of course, the efficiency/profitability of this operation was highly dependent on placing all of these various dies/patterns on the hide in a configuration that minimized the scrap generated from the off-fall between the dies. Unfortunately, unlike fabric which came on a roll in a consistent size and pattern, this process was made even more complex in that every hide was unique in its size, shape, and defects (such as holes or scratches).

Therefore, before the cutters were even able to determine the best layout of the dies, they had to mark the location of the defects. That way they could cut around them and not have the defects appear in the finished cutout.

Cutters could then start to conceptualize what dies should be placed where based upon the actual shape, size, and defects of the hide they were dealing with. To this day I think the individuals performing this layout of patterns were some of the most impressive people I have worked with. They possessed an unbelievable skill set and ability to geometrically envision where to place all of these varying patterns across a continuously changing background of hides.

In any case, this is where I saw a possible opportunity for the use of artificial intelligence. Working with a university and other experts, it was believed that there was the availability of both the scanning technology and optimization algorithms to attempt to improve the maximization of the layout of these cut patterns thereby minimizing the scrap.

The process would look like this:

1. Place the hide on a table and manually mark the defects. Note, it was anticipated that over time, even the determination of the defects could eventually be learned (form of AI) and used through the scanning of the hide by the computer to establish the type and location of the defects.

2. Use the scan and a known set of cutting pattern shapes to run a maximization model that would project with light the placement of the patterns on the hide with the objective of minimizing scrap.
3. Place the patterns based upon the computer projection and punch the dies into their final patterns.

Unfortunately, given that each hide was unique, while the process was determined to be achievable, the amount of time to process the maximization model was too long to make it economically feasible. However, before we gave up, I wanted to try to use AI in a new way to solve this challenge by not running the optimization model from start to conclusion for each and every single hide.

Instead, I felt we needed to limit the optimization modeling on any given hide to a specific number of iterations. While we would not necessarily maximize the layout of the patterns for that specific hide, we could use the information to have the computer learn over time thereby improving its layout as it continued to process future hides.

In other words:

a) The computer would learn over time by continually building a data base of initial hide shape, size, and defect configurations along with the last arrangement of patterns used on that hide configuration.
b) Instead of the algorithm starting from ground zero for each hide, it would first scan the new hide and look into the existing data base of cut hides to find a hide that had the closest match to the size, shape, and defect patterns of the hide being scanned.
c) The computer could then start the optimization model using the last pattern arrangement that existed for the hide selected from the data base.
d) This meant that as time went on, the computer continued to learn through the accumulated data base of pattern arrangements to hide configurations and would become more and more efficient in minimizing scrap. AI at its finest!

My hunch is, given the sophistication of the application, you might think these efforts where perform recently. But in fact, they actually took place in the early 1990s.

Regrettably, while the concepts and applications were proven to be viable, the computing power and data base technology did not exist back then to support a financially feasible result.

Fast forward to today where there are massive existing data bases of various types of information and a significant advancement in computing power. Then wrap this in an intensive state of promotional, economical, and media overload. How should we proceed and how rapidly should we proceed at?

In my mind the answer is straightforward, AI needs to be addressed in the same context as any other emerging technology we have been exposed to. In addition, there are Change Science concepts and tools that can be leveraged to assist in this process.

The concept of “WHEN NOT IF” tells us that we are beyond the point of IF artificial intelligence will impact our lives and businesses. So, our focus should be on the WHEN and in what context.

1. The reality today is that for most individuals and organizations the costs associated with AI are too great to allow for major self-developed capabilities. AI still requires the accumulation or access to massive amounts of data and computing power to work.
2. This means that only the Government and the largest organizations are currently in the best positions to directly participate as borne out by the initiatives at Amazon, UPS, Google and other large organizations.
3. It also means that for most, utilization of AI will be limited to AI applications available in the marketplace such as ChatGPT. As discussed below, this then requires a close look at the use of Functionality Tradeoff Analysis.

If, similar to my attempts in the 1990s, an organization decides there might be an internal AI opportunity, then I would highly recommend the use of the DISCONNECT ANALYSIS as a tool to assist in the evaluation. Disconnect Analysis determines what the conditions are within an organization that need to be changed versus the requirements of the AI process under consideration. These Disconnects, along with the assumptions being used, can then be evaluated and tested in advance to determine the feasibility of the initiative.

The assessment of risk using Disconnect Analysis goes beyond a cost/benefit analysis. Disconnect Analysis defines and examines all the factors required by the AI process against the amount of effort, reliability in the assumptions, and the actual internal and external organizational conditions that exist. In turn, if the AI initiative appears to be feasible, the organization can further use the analysis to determine testing, resource requirement, and timing considerations.

Functionality Tradeoff Analysis is a powerful tool to use when it is determined that there might be benefit in the utilization of an external AI application or tool. A Functionality Tradeoff exists when the selection of one functionality (an external AI application) is interconnected in such a way that you cannot obtain that functionality without sacrificing another desired functionality or capability. This generally then represents some sort of risk to the organization or individual.

Some of the biggest potential Functionality Risks that have already been associated with existing AI applications include:

1. Inaccuracy of output because the underlying external data in the AI data base is overly summarized, bias, incomplete, or not inclusive of the data required to provide an accurate result relative to your conditions.
2. There is an AI requirement to provide user data that is personal, confidential, or broader than necessary thereby opening your organization or you to new security, data usage, or other risks.
3. There is a reliance that there will be ongoing access to this external AI functionality versus internal functionality and that data integrity will be maintain in the future. This risk can be significant depending on the level of dependance and significance the AI functionality represents to your organization.

4. Since this is an external versus internal functionality, there can be known or unknown modifications and updates to the AI functionality or data base that invalidate or negatively impact the utilization of the output from the AI application.

Again, AI needs to be addressed in the same context as any other emerging technology we have been exposed to in the past. We should not be reactionary but analytical. AI needs to be continuously monitored for existing or emerging opportunities and then carefully analyzed from a Disconnect, Functionality Tradeoff, and “When Not If” perspective.