Paving the Way for Artificial Intelligence in Electrical Contracting

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Every time technology changes there is an apprehension by the users of current methods and technologies. The fact is that only technologies that are able to replace an existing method of doing things with current technology and sustain themselves are the ones that offer something above and beyond what current technology offers. The same is true for artificial intelligence (AI).

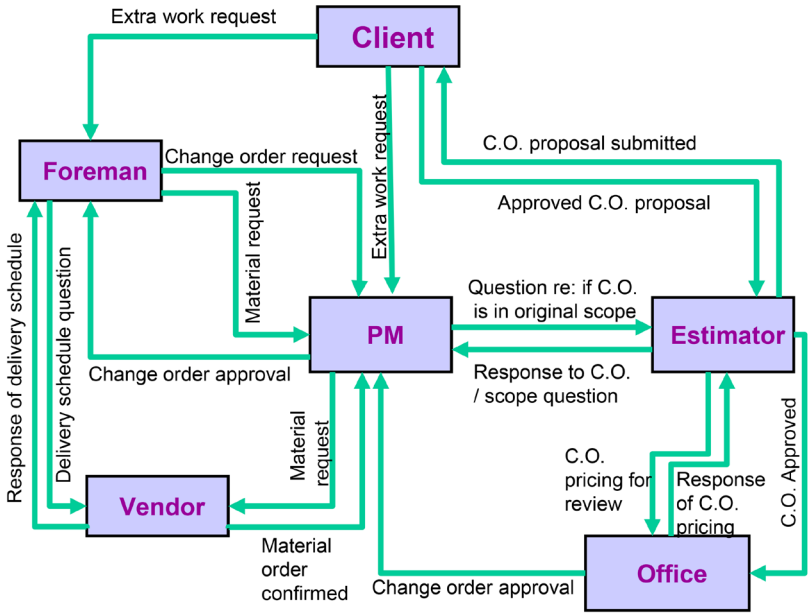

Figure 1: Change Order Sample Spaghetti Flowchart

Artificial Intelligence is our friend and not our enemy. However, it can't exist without data and information created by humans for now. The taxonomy of human learning, creation, and wisdom is based on human intelligence learning sequence.

Development of new technology may be irrelevant to an existing provider's services, but once available, many derivatives of it can disrupt an existing provider's services — especially in the fringes and unrelated markets (e.g., fax did it to mail, Uber did it to taxi service and food delivery, Toyota did it to General Motors). Anything crafted or fabricated stems from human hands. Once the data centric operations replace the current tacit knowledge centric, where the highly paid skill tradesmen do all the work, the role of data and its transformation to information through AI will take a more dominant role. The future of the contracting industry will look something like the following:

1. New breed of contractors will be forming to replace the current backward ones
2. New breed of distributors will be forming
3. Digitalization, Commonization and Interconnection® (DCI Construction®) will connect the distributors, manufacturers and contractors seamlessly
4. Current distributors with very low first time pass in their warehouse, which focus on project management only with brute-force, will give away to the ones that will use Toyota Production System or completely disappear
5. A global architecture, engineering, construction consortium will replace current segmented industry
6. Cost, time and quality of shelter, which is the main objective of construction to satisfy the basic human needs, will be reduced to affordable levels of 25-30% of annual income, vs. 300-600% at the current times.[1]

[1] Predictions by Dr. Perry Daneshgari, 2021.

The path is much simpler than most people think. It starts with transferring all individual notes, yellow and green sheets, excel files, individual tracking files, smart sheets, or any other means of data and information into a database driven collective depository. We call that Digitalization, Commonization and Interconnection (DCI)®. And NO, it is not another accounting, CRM, ERP, or Smartsheet. It is centralization of the company's knowledge in a digitized form. It is how all the data is connected together with a single point of entry and

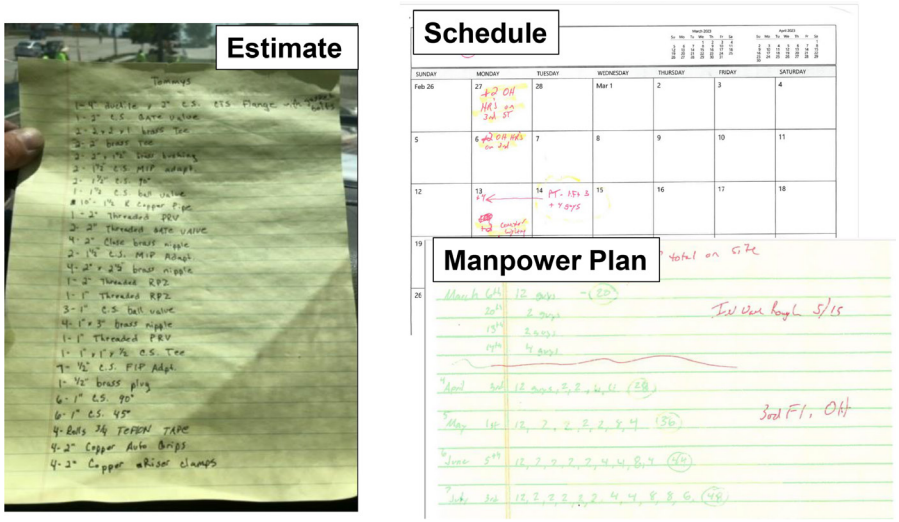

Figure 2: Data Sources for AI

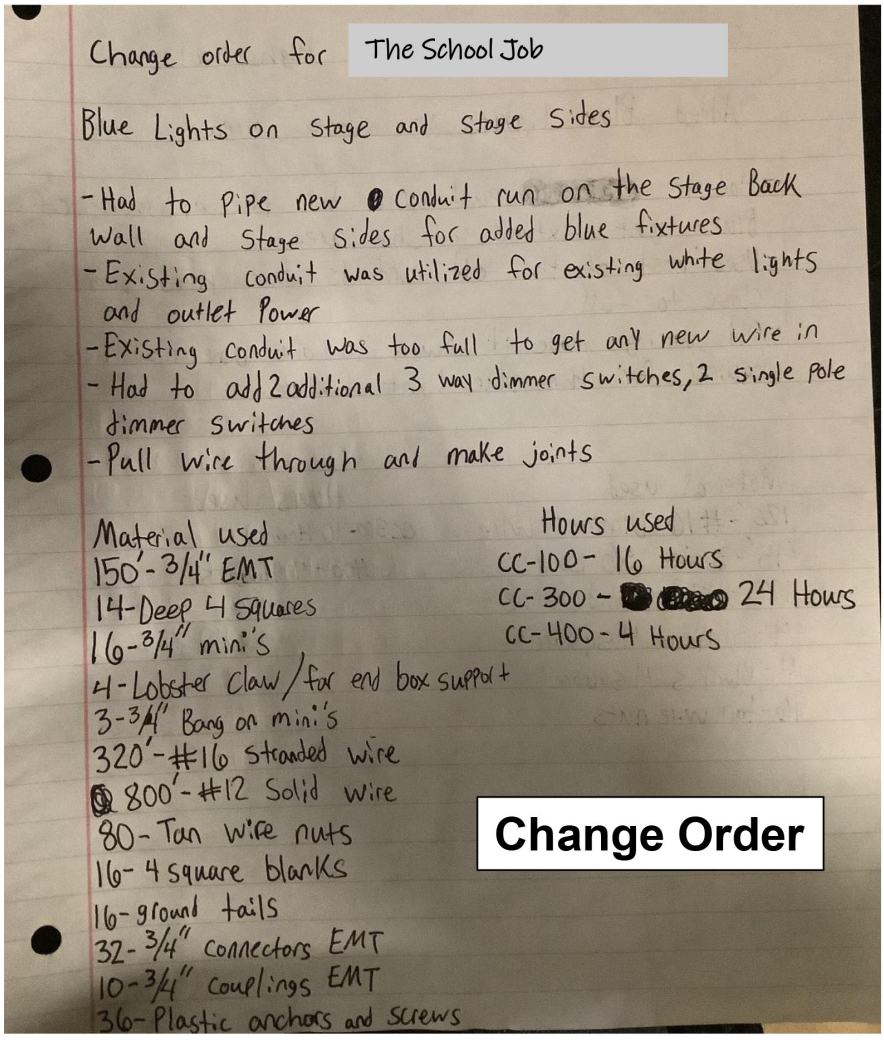

Figure 3: Data Sources for AI

Single Point of Review (SPR®). It relies on the following facts:

1. Without data everyone is just an opinion.
2. Data has to transfer to information, knowledge, and wisdom to become useful
3. Tacit knowledge can only be transferred to explicit knowledge through data
4. Prefabrication is lagging due to lack of data collection and management skills of the industry
5. Not every data lead to wisdom
6. Data management will require:
   a. How it is collected
   b. Who is collecting
   c. How it is reported
   d. How it is recorded
   e. How it is presented[2]

[2] Dr. Perry Daneshgari, 2024

So, what to do next? Three simple steps

1. Start with a map like we have in **Figure 1**, which shows all the functions and information flow that have to be involved to get a change order done.
2. Identify the tools, software, or any means that you currently use to get that each piece of information.
3. Are they connected? If not use DCI to connect them.

AI and Agile Intelligence™ have to rely on clean and available data to produce the information needed for humans to make decisions based on their tacit knowledge. **Figures 2 and 3** are some samples of the types of data that could be collected for usage in the AI environment.

For example, **Figure 3** shows an example of a Change Request, recognized and written down in the field (thankfully!) for adding infrastructure needed to support additional fixtures. By digitalizing the process (see **Figure 1**), the Change Log in DCI Construction® collects these field inputs real-time in a common way to move the information to the other functions in the map as

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needed, and also interconnects required data to accounting software.

While Accounting may be tickled to receive Change Orders real time, faxing over a stack of legal sheets is daunting; meanwhile, the field may not have all the information the PM needs or knows about the scope and approval of such Change requests. These gaps are closed with the Change Log, making visible the vast amount of work electrical contractors do that goes unnoticed, uncaptured, and unpaid for.

The common concerns about AI such as fear of "replacing humans," fear of data misuse and abuse, fear of losing control (the AI breeds its own life), are not new fears. They go back to the first time Gutenberg printed a book. On the other hand, a very valid concern is employees, especially managers and executives, to utilize AI or any software, without following D, C, and I. For example:

1. Your newly hired Vice President wants to create his own Smartsheet for manpower planning.
2. Your CFO decides to overturn your currently stable WIP process to meet the needs of her new Accounting Software.
3. Your BIM Department Manager, unbeknownst to you, is using "free" web-based software to store and track order status with the field.
4. The access to software and now AI, lets people believe they have a license in process design, and end up using the software as a crutch for thinking and using the taxonomy of human learning and creation. It will set companies back that have gone through that taxonomy, and may not have yet found a good house for the results.

In summary, what the construction companies will be seeing in a near future will take the following shape:

1. Tools (software & hardware) are used to gather intelligence from the source of construction value transfer (the tekhne).
2. Some providers of the technology will use it to aid the construction process; others will use technology "blindly" as if the data itself is valuable (instead of the information it can provide).
3. Pioneers and early adopters of the AI tools will find out which providers have a true source of Agile Intelligence™ vs. Artificial Intelligence.
4. The workforce will resist, similar to prefab in early 2000s, due to fear of replacement; overcoming this will take proof that the AI expands / allows for more and better knowledge transfer of the craft.
5. Logistics providers will become an embedded part of the information flow to / from / in the AI.
6. Standards and regulations will need to be set to avoid misuse and bring expansion of the AI usage.
7. New derivative products and services to support AI will be developed.
8. Physical limitations in computing, or a new application of supporting tekhne expansion, will replace today's "AI".[3]

[3] Dr. Perry Daneshgari and MCA, 2023

In conclusion, as we stand AI is not even at its embryo, and without data created, cataloged, and codified AI or any other tool can't be doing what humans do. But just like fax machines if we don't connect the dots (Data), they would be useless.

Dr. Perry Daneshgari is the founder, president, and CEO of MCA Inc., and Dr. Heather Moore is the vice president of customer care and support for the company. MCA is a research and implementation company that focuses on implementing process and product development, waste reduction, and productivity improvement of labor, project management, estimation, accounting, and customer care. Dr. Perry was to present on this topic at SPARK 2024.