

The Data Revolution in Construction is Upon Us and Poised to Transform the Industry

Written by: Michael Pink, CEO of SmartPM Technologies

The construction industry is one of the most complex yet least understood industries of the 21st century. Meaning, it is still unpredictable and cost overruns and delays are common, misunderstood and often argued about. In addition, the construction industry has failed to be opportunistic and take advantage of technology, making it one of the least progressive industries that exists today. This has been slowly changing over the past five years, and I believe that the industry's progression is about to accelerate due to the imminent data revolution.



I started working in the construction Industry immediately after I graduated from college in 2001. I received an Industrial Engineering degree, which is essentially a major in processes, systems, and efficiency, and my job entailed analyzing construction project data to help clients better understand their construction projects.

One would think that the purpose of my role was to analyze construction projects to help Construction Managers (CMs) better understand their processes, identify breakdowns, and recommend areas for improvement to obtain maximum efficiencies, but that is not the case. Instead, I was hired to help companies settle disputes on large commercial construction projects – using my data collection and analysis skillset. Yes, that's true, instead of paying money to analyze data proactively in order to minimize overruns and delays, I was paid to help people argue about responsibility for the problems that occur as a result of NOT studying project data, after the proverbial shoe has dropped. This was always counterintuitive to me – but, nonetheless, a very lucrative career.

Quite often, as I waded through boxes and boxes of documents in order to collect relevant data to be studied, I often pondered why the industry as a whole would step into every new project assuming this time would be different, and why they would invariably continue to believe this until far too late in the project lifecycle to do anything about it. After all, the data I was collecting was available throughout the duration of the project and if studied in real time, would help avoid disputes altogether. Did they not know how to analyze data proactively, did they not see the value, did they not care?

Eventually, after I admitted that I was actually part of the problem and not the solution, I quit this racket. This was prompted mostly by years of watching consultants “spin” data, argue for the sake of arguing and actually high five if we DIDNT settle a dispute. No, lots of consultants are perfectly happy to testify in to court, mostly because litigation support fees are big money.

I have since spent a lot of time working through this problem to find a better way to analyze project data to avoid delays, overruns, and disputes altogether. At the time, I believed that I knew enough about analytics, but I needed to understand the people and the problem better. I spent years interviewing hundreds of people and getting their opinion on why they didn't practice the proper data analytics on the front end of a project. And I found these to be the top reasons:

- Most people in the industry don't know how to analyze data to the level necessary to consistently avoid overruns and delays.
- Industry professionals are generally optimistic and have good problem-solving skills, so they enjoy challenges and are confident that they can always solve them – to a fault.
- The manual process for analyzing data effectively is much slower than the pace of construction and decision-making. So, studying manually is expensive and usually can't keep up with the project.
- Consultants are too expensive to hire on every project for the duration of the project, so people take their chances by relying on their problem-solving skills.
- Even if consultants were affordable, there are not nearly enough people with the proper skill set to effectively analyze even 5% of commercial projects. As a result, they are only deployed for the largest, most expensive projects.

These are all legitimate reasons for not practicing proper data analytics. They are also opportunities to solve problems with technology. These days, technology can effortlessly house loads of data and perform sophisticated analytical processes lightning quick. And, instead of training the next generation of construction professionals to perform long, drawn out, manual processes for understanding analytics, technology can perform these functions in a fraction of the time, and provide decision-makers with the answers they need to make good decisions that will minimize the inherent risks that come with not studying data.

So, as more and more technology solutions are adopted and more and more innovative processes get automated, the industry will be able to better leverage data analytics. And, I believe this will be achieved in the next five years! It will be a new age of construction where million-dollar decisions are made based on data rather than opinions.

A Brief History of Construction Technology

As I alluded to earlier, as recently as 10 years ago, a lot of information at the project level was captured and transmitted via paper. This includes construction drawings, daily work reports, meeting minutes, Requests for Information (RFIs), Change Orders (COs), etc. I know this because I had to manually wade through these documents and extract data to analyze on behalf of my clients. The main technologies that had been adopted at the time of my entrance into construction were ERP systems, Accounting Systems, desktop project management systems, and scheduling systems. Most of these systems were disconnected and somewhat clunky – often residing on many different computers, making it very difficult to analyze data across the project life cycle.

Over the past 10 years, the industry has adopted technology much faster than ever before, albeit a little slower than other industries. And I expect continued adoption to completely transform the industry for the better – just as technology has done for most other industries. The following is a list of the broader

technological developments that I believe are driving the data revolution that is about to occur in this industry:

1. **Electronic Correspondence:** The first major technological shift in the industry came when correspondence moved from paper to electronic formats. This shift added many efficiencies to the Construction Management process, not to mention, data was now available in an analyzable (electronic) format. The information contained in project level documentation provided visibility into the day to day operations of the project team, while adding a major efficiency in the processing speed of decisions. The digitization of data is the key requirement and driver of the data revolution.
2. **Building Information Modeling:** The next major development in construction technology was BIM, which stands for “Building Information Modeling” – the technical name for digitized 2D design drawings that are converted to a computer-generated 3D Model. This ability to view designs virtually in 3D revolutionized the design process and added several efficiencies to the Construction Management process – including design conflict management, RFI management, estimating, planning, and cost management. This will have a much greater impact on the industry as we enter the data revolution because it allows the computer to understand the area for which the data is related.
3. **Cloud and Mobile Technology:** The next ground-breaking moment in the history of construction technology was the introduction of cloud and mobile technology. These new capabilities enabled all parties involved in construction projects to save and access useful information from a single place - the Cloud. Information could now be saved in a consistent format and organized in a systematic way across multiple systems, including Project Management, Accounting, ERP, and scheduling. The true value of this innovation that has yet to be seen is the analytical horsepower and ability to access to information that come with this technology.
4. **Adoption and Improvement of CPM Scheduling Systems** – It wasn’t too long ago that scheduling technology was available but not heavily utilized – or even required. Nowadays, 99% of the contracts out there require a CPM schedule and an updating process. Unfortunately, this has basically developed as a result of it being consistently the best source of “what happened,” but the very fact that it is becoming more utilized in the industry, particularly in the middle market, is what is required for entire teams to better see the best workflow of a project. This inherently reduces risk. More importantly, the schedule is the only data set that contains a planned roadmap for construction and explains how all the parties involved are interrelated. Given its complexity, it requires a lot of CPU horsepower to be analyzed effectively – which can only come from the cloud.
5. **Construction Cost Databases** – RS Means has been around a very long time, but most of the data that was captured originally didn’t come from complete data sets. Now that the cost data in most projects is available electronically, it can all be placed into one large database and analyzed. Gordian Group is a company that is doing great things with cost data! And once you have cost and schedule being analyzed in the same place, optimization can occur.

The Data Analytics Revolution that will transform the Industry

If you read between the lines here, you might be able to tell that I believe that the collection and storage of electronic data regarding a **buildings design** and all the work surrounding it, the initial work **schedule** and changes along the way, and **cost and manpower information** for installation of virtually all materials across all markets - is the recipe needed for understanding the industry in ways it has never been understood before. Once these data sets become available and are associated to one another, the industry will be changed forever – for the better.

Seriously think about those things: If you have a design that can be broken into parts and associated both to planned versus actual schedule and cost at seriously granular levels, one can understand workflow, delays, cost, productivity, and risk in all areas of a project at the click of a button. If we study this collection of data on hundreds or thousands of projects over time, perhaps with a mass analytics tool, we will eventually understand the construction industry like never before.

What the Industry will look like in 20 years – A Large-Scale, Moveable Manufacturing Facility

I believe what I explained above will be available in the industry in five years, but the next question is “What will the industry look like in 20 years?”

As mentioned before, I believe that data analytics will spawn the reinventing and transformation of what we view the construction business as today. This is happening now. It won't take too long before Automation, Artificial Intelligence, and Machine Learning leverage this data in numerous ways to make it understood and obviously more efficient. We are just starting to scratch the surface now. But after 20 years of data collection, analysis, recollection, analysis, mass collection, analysis, and recollection of mass data and analysis, we will see a whole new industry that almost functions like a large scale, moveable manufacturing facility.

1. **Design Management** – I envision building design will require far fewer architects and engineers. Building design will simply require a person with ideas and a computer program that can make it work from an engineering standpoint.
2. **Estimating** – I envision that Designs and BIM models will be loaded into a system that will automatically prepare a detailed budget and schedule for the project.
3. **Scheduling** – Schedules will be created by computers based on the design, economic conditions, location, time of year, etc. Schedules will also be updated every day based on the daily progress data captured by drones, robots and cameras. When delays happen, they will automatically be recorded, and the schedule will incorporate the new data and develop risk-adjusted scenarios and recommendations for mitigating delay or improving performance. Scheduled completion dates will be accurate, feasible and realistic. Trade Contractors will live and die by the schedule and delay disputes will no longer exist.
4. **Cost and Payment Management** – Actual cost data will be passively captured on its own every day. Timesheets will be automated. Equipment costs will be calculated. Material costs will be tracked as well. Payment applications will no longer be needed, rather technology will exist that enable payments to be made every day based on the progress of the job (as per the schedule).

5. **Contractor Procurement** – Imagine an online marketplace for construction companies, equipment providers, and material manufacturers. There may be some bidding and scoring involved, but it will feel more like online shopping when looking for vendors.
6. **Material Delivery** – Material fabricators will have access to the design and schedule. The schedule will know when the materials need to be delivered to the site and will always be “Just In Time.”
7. **Labor** – There will be a wealth of access to labor markets and each project will know exactly how many laborers of each trade need to be there every single day to keep up with the project. And they will show up. And I bet laborers are sourced online.
8. **Construction Equipment** – There will definitely be more intelligence and robotics involved in construction, but I don’t envision robots taking over and replacing people. I envision people building more efficiently by leveraging robotic enhancements. That being said, I envision data being collected from the field strictly by robots and drones. That data will produce analytics that are relayed back to the project management team to make decisions regarding RFI’s, Schedules, Cost Management, Risk, etc.
9. **Construction Management** – I believe GC’s will no longer exist, and the term CM will represent a group of people who oversee all the technology systems to achieve the desired results (see above).

Conclusion

I envision a future with some vast improvements in the way things are built and the processes followed to make it happen. This will be made possible by the capturing, storage, and analysis of data. The more and more data captured and analyzed in mass, the better, more efficient, and eventually, more automated the industry will become. What does that mean in the long term? Better returns on investments and less arguments, of course!

###

About the Author

Michael Pink is the Chief Executive Officer at SmartPM Technologies. He is an experienced construction industry executive with 17+ years of experience in global capital construction program management, risk advisory, and dispute resolution in the Power and Renewable Energy, Gas/Pipeline, Industrial and Manufacturing, Commercial and Residential buildings, Healthcare, Education, Transportation, Entertainment and Retails sectors. Michael can be reached at mpink@smartpmtech.com.



About SmartPM Technologies

SmartPM™ is a cloud-based project analytics solution designed specifically to minimize delays and overruns in the commercial construction industry. It is a full-cycle project-based, analytics solution, which provides owners with a 360-degree-view of every project within their portfolio.