

Uptake

A predictive analytics platform disrupts the industry from within via strategic partnerships

Case Study prepared by the Boston Consulting Group as part of the Future of Construction Project at the World Economic Forum



The challenge

The ever-expanding mass of data generated by the Engineering and Construction (E&C) industry still awaits proper capture, analysis and exploitation to be able to benefit from a slice of this trillion-dollar opportunity

During all project phases, from planning to Operations & Maintenance (O&M), E&C accumulates a profusion of disparate data, collected from sensors embedded in equipment and buildings, as well as from design records, planning software, and project control systems. Unfortunately, the vast and varied volume of data is not captured or analysed systematically. Much of it remains siloed among different stakeholders and gets lost over the project's lifecycle.

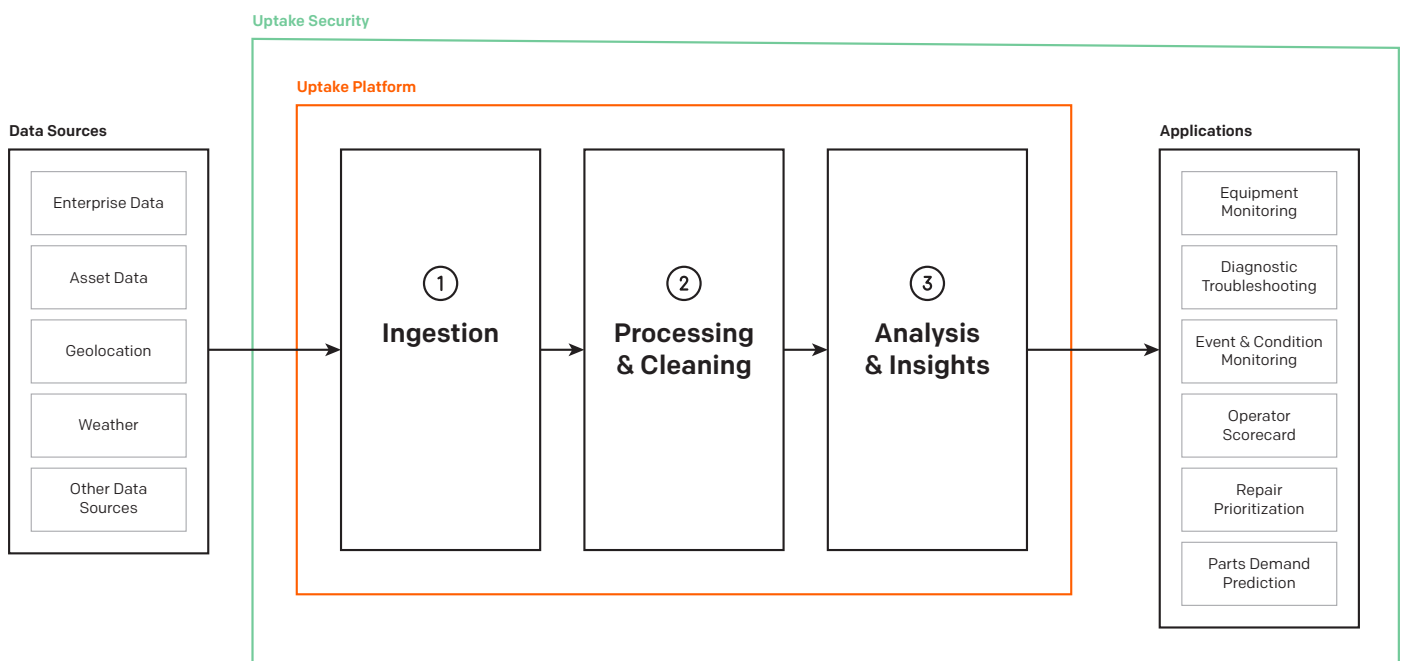
In the near future, this unruly data mass will proliferate exponentially as the industry continues to digitize, through the use of drones, Building Information Modelling (BIM), wireless sensing, 3D scanning and other technologies. Companies can capitalize on it—the opportunity is there for the taking. The so-called Internet of Things (IoT) is expected to generate up to \$11.1 trillion annually by 2025, including an annual \$4.6 trillion for industrial applications, such as predictive maintenance and operations management. This is a particularly relevant and inviting opportunity for E&C companies that are typically low-margin businesses and therefore, keen to improve their profitability. The latter can be achieved in two ways namely, by optimizing planning, design, engineering, construction and O&M as well as identifying new revenue streams through the use of data. Yet, legacy IT systems are holding them back, creating barriers to capitalizing on digital transformation with speed.

The idea

Ingest disparate, real-time and historical data onto a scalable and fast-analysis platform to generate valuable insights

Uptake is a predictive analytics software company, founded in 2014 by Groupon co-founders Brad Keywell and Eric Lefkowsky in Chicago. It provides predictive analytics solutions for fixed and mobile assets, covering industries including rail, mining, aviation, agriculture, energy and construction. The company offers a predictive analytics platform, which uses real-time and historical data from heavy equipment as well as contextual information about weather and the environment to optimize operations for equipment owners. Construction firms, for example, can prevent unscheduled downtime, extend the lifespan of machinery and improve equipment dispatching and planning.

Uptake's unique business model revolves around strategic partnerships with leading industrial companies, in order to access large data sources, industry expertise and installed base. Uptake leverages strategic partners' expertise to identify industry challenges and develop relevant solutions. Solutions that address partners' specific pain points and enable new data-driven business models and revenue sources. This industry partnership approach to building software ensures that applications are relevant and provide quantifiable value to end customers. In the words of its co-founder and CEO Brad Keywell: "We are choosing to deploy our speed and agility to innovate with an industrial partner who has a strong edge, rather than the traditional entrepreneurial disruption model of approaching an industry from the outside." The functioning of Uptake's platform can be divided into three steps:



1. *Data ingestion and integration.* Inputs include data of all types, including the client's machinery, business systems (e.g. SAP, ERP, CRM), design files (e.g. CAD, BIM), satellite imagery or Geographic Information Systems (GIS), weather and geography. This abundance of disparate real-time data is screened instantaneously, secured by encryption and sorted by the platform, ensuring that only the data points relevant to a particular analysis are used to drive predictions and that others are disregarded. It's a feature known as "data integrity." The platform provides a holistic view of the client's business and breaks up the data silos of business units, teams, projects and processes.
2. *Data analysis.* The single unified approach—in which all data types are standardized or "translated into a common language"—enables real-time analysis and rapid multiple iterations on Uptake's servers to generate practical insights—and continually improved results. As of January 2017, the platform can run more than 1 million data science models per hour thanks to a team of more than 60 data scientists, many of whom have PhDs from leading research institutions around the world. Those models detect patterns in the data and generate predictions.
3. *Workflow integration.* The insights are translated back into the initial language of the client's system and integrated into the client's workflows through applications that run on Uptake's platform. Applications designed for specific industries or uses make Uptake's findings actionable for a broad spectrum of stakeholders within an organization. As an example, these could include alerting machine operators or building managers to potential disruptions and generating recommendations for ways to mitigate those risks as well as capture new opportunities. Thanks to this translation, it is relatively easy to integrate Uptake's solution into a client's legacy system, as no change is required to the client's IT landscape. Unlike a system that provides raw data to a single person or department within an organization, Uptake's solutions propose specific actions for the right person at the right time within an organization.

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Working with Uptake can be a transformative experience that unearths new value sources for industry incumbents. At the end of this process, clients might say ‘I am a technology company that just happens to sell iron’.
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Trevor Mecham, VP Construction and Agriculture

Uptake's platform is designed to be Original Equipment Manufacturers (OEM)- or vertical-agnostic. Built on a single-code base, the platform aggregates and anonymizes data to share insights across multiple verticals. This cross-learning platform can be applied to different industries and integrates insights from a variety of high-value, heavy equipment industries such as agriculture and mining, where data is collected very frequently to offset the remoteness and extreme conditions of their operations. The experience from autonomous equipment, combined with GIS in agriculture, could generate insights that are relevant for autonomous E&C equipment, such as drone-led bulldozers.

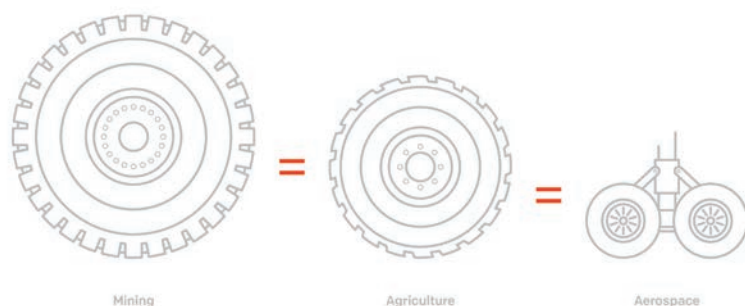
By enhancing its data and insights via iterations and machine-learning algorithms, Uptake continuously improves its platform and upgrades its services for clients. The platform is embedded with world-class security controls, ISO 27001 process and kept ahead of potential vulnerabilities through a proactive security software development program.

The impact

The construction industry now has a powerful way of turning data into value. The Uptake approach has enabled clients to boost the productivity of their equipment and generate new revenue streams.

Uptake's platform provides two main benefits for E&C companies. First, a direct benefit whereby construction firms can now deploy their fleets with increased efficiency. Second, since the platform enables equipment manufacturers to develop new service offerings, such as refined diagnosis and repair solutions, E&C companies can now derive greater value and longer working lives from their machinery, thanks to prognostics and improved maintenance.

E&C companies, as owners of equipment, will benefit from Uptake's monitoring solutions, e.g. performance monitoring, asset benchmarking, reminders of maintenance cycles, planning insights, e.g. forecasting operational disruption, identifying trends and efficiencies, and optimization of processes and assets, e.g. supply-chain improvements, fuel-efficiency measures, minimizing of unscheduled downtime.



Consider just one example of the power of Uptake's solutions: Uptake produces comparative health scores for the client's various assets and is able to predict major system failures, thereby enabling the client to optimize equipment allocation and maintenance. In addition, the platform can alert the client's troubleshooting teams to imminent failures - with close to 100% accuracy - and identify the root cause of the problem. Uptake's diagnostic function indicates the exact part of the equipment that needs repair and specifies the requisite tools and replacements. For one pilot customer, the overall outcome is an estimated 30% reduction in workshop time, 10% reduction in unnecessary repairs, e.g. 'no defect found' and 40% reduction in repeat visits to the repair yard. This translates into considerable projected savings, with an average fleet of 3,000 engines being monitored and yielding up to more than \$22 million annually.

Uptake's initial success has not gone unnoticed by investors. They have valued the company at more than \$2 billion, the fastest ever to that valuation according to Pitchbook. And Forbes Magazine has ranked Uptake as the "hottest start-up of 2015," ahead of Uber, Slack or WeWork. Uptake is proving to be a very agile organization and is growing rapidly from week to week, with about 100 new employees hired during the second quarter of 2016.

The barriers to innovation, and the solutions

Gaining expertise through strategic partnerships with key industry players

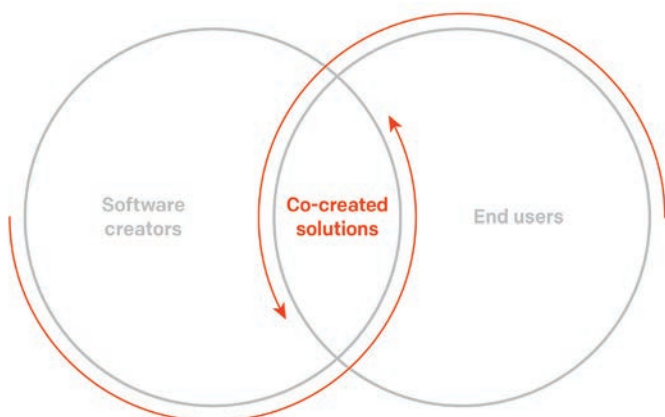
An early hurdle for Uptake was addressing the reservations expressed by conservative industries, particularly E&C. Many companies do not, or do not want to, recognize the added value of incorporating data analyses into their existing business models and operations. Also, many fear that big data solutions require changes to the process and IT setup, causing huge costs, business interruptions and system unreliability. So an important part of Uptake's strategy is to educate the market by identifying and highlighting opportunities to improve efficiencies in an enterprise as well as helping executives realize that those efficiencies can be realized through data analytics. The best way to pursue this strategy, Uptake decided, was to begin this journey with its industrial partners, including Caterpillar. The partnership approach is mutually beneficial because industry leaders can innovate rapidly

without having to develop massive capacity in non-core competencies, such as data science and software development. More specifically, a partnership ensures that Uptake focuses on solving real, complex and relevant industrial problems while bypassing development and learning cycles. The results are enormous savings in development time and resources for Uptake's partners and a software platform that delivers real, measurable value to partners and their end customers.

Among the added benefits of the partnership approach is access to data. Uptake's machine-learning algorithms rely on access to large pools of industry data. Such access enables the platform to improve in quality and accuracy over time. The more the platform is utilized, the more robust it becomes. However, Uptake initially lacked such broad access and to illustrate the value, opted to develop a platform configured on the basis of a restricted data set that helped to demonstrate its efficacy. When this initial version of the product was duly-applied to a restricted dataset of one of Caterpillar's subsidiaries—Electro-Motive Diesel Inc. (now Progress Rail)—it promptly showed its potential for optimization, scale-up and provided evidence of the value that Caterpillar was seeking to formalize a partnership.

Another challenge Uptake has overcome is the enormous diversity of the data being analysed given that the data comes from many different sources and formats. Therefore, Uptake normalizes and integrates it all into a central platform on which to run analytics. To enhance this task in the future, Uptake is pushing for standardized data formats—within the Association for Equipment Management Professionals, for instance, and jointly with other companies in a consortium defining and endorsing data standards, such as CAN and ISO. In this context, Uptake is playing an active role in shaping the market and regulatory environment.

Uptake is also working to move beyond client assumptions regarding tailored solutions versus a scalable, industry-independent, OEM-agnostic data platform. Uptake addresses this prevailing thinking in two ways. First, it deploys in-house industry experts who have a deep understanding of client needs and "speak the same



language.” Second, it dissolves the contradiction by adopting a single code base yet configuring the platform to the specific client situation and to different industries. This flexible and responsive approach is very much in keeping with Uptake’s entrepreneurial philosophy—start from clients’ pain points to develop new solutions while preserving the benefit of a single code base and feature abstractions to serve many markets.

As it seeks to scale further, it is targeting other key elements of the construction value chain—for instance, expanding into planning by including design firms. To this end, Uptake has developed adjacent applications for its analytics platform:

- With data on machine utilization, Uptake can help contractors in the bidding and tendering process to optimize machine planning and make a more accurate prediction of machine usage
- With data on buildings, Uptake could enable building designers to feed information about existing buildings, including performance and potential weak points, back into the planning and design process for new buildings
- With the increased use of sensors and smart equipment—such as smart meters, valves, and shadings—buildings are now creating massive amounts of data that can be used to enhance facility management and energy performance. From its experience with energy clients, Uptake could also help optimize air conditioning and heating as well as couple needs with optimal energy sources. For instance, historical data, in combination with up-to-date satellite imagery or weather data, could alert building managers to an imminent leak in one part of the roof in the event of heavy rain.

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We are choosing to be disruptive with an industrial partner who has a strong edge, rather than disrupt the old-fashioned way from the outside.

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Brad Keywell, co-founder and CEO

Lessons learned

- **Form partnerships with key industry players**
Through its partnerships with established industry leaders, Uptake has succeeded in overcoming market resistance and refining its technology solutions to resolve critical industry pain points. What is more, the prestige of these partners has boosted Uptake’s own reputation and credibility as well as heightened its efficacy in educating the market. Thanks to the partnership approach, Uptake can be seen as “disrupting industries from the inside” rather than simply acting as an external force. This approach also ensures that Uptake shares in the risk of its solutions and possesses a common agenda to yield positive outcomes for both parties.
- **Get data scientists out of the office**
At Uptake, data scientists are outfitted with steel toe boots, which they wear when they go into the field to learn about a partner’s industry from the ground up—literally. Their field research ensures that Uptake is solving real, complex and relevant industrial problems.
- **Start with a client’s pain points when tailoring a solution**
Uptake’s entrepreneurial approach of starting from its clients’ pain points is rare in the E&C industry. Together with its clients that manufacture, own or operate heavy equipment, Uptake develops and scales up data-driven business models to generate additional revenue streams.
- **Eliminate changes in workflow to reduce adoption challenges**
Uptake’s solution can be easily integrated into its clients’ legacy system, as no change is required to the existing IT landscape. This encourages increased adoption rates and means that integrated insights proposing specific recommendations for action are delivered to the right person at the right time within an organization.
- **Execute with speed to truly innovate.**
The average company takes 12-18 months to roll out a new data science model. At Uptake, its data science team can deploy a model in three days. Uptake’s entrepreneurial approach pairs incredible speed with ambitious execution to yield its innovative solutions.
- **Break down silo thinking and systematically incorporate lessons from other industries**
Uptake’s unified approach makes it easier for the company to integrate and analyse disparate data sources and generate productive insights. The platform is built on a single code base (OEM- or vertical-agnostic) allowing for lessons learned to apply across verticals.



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