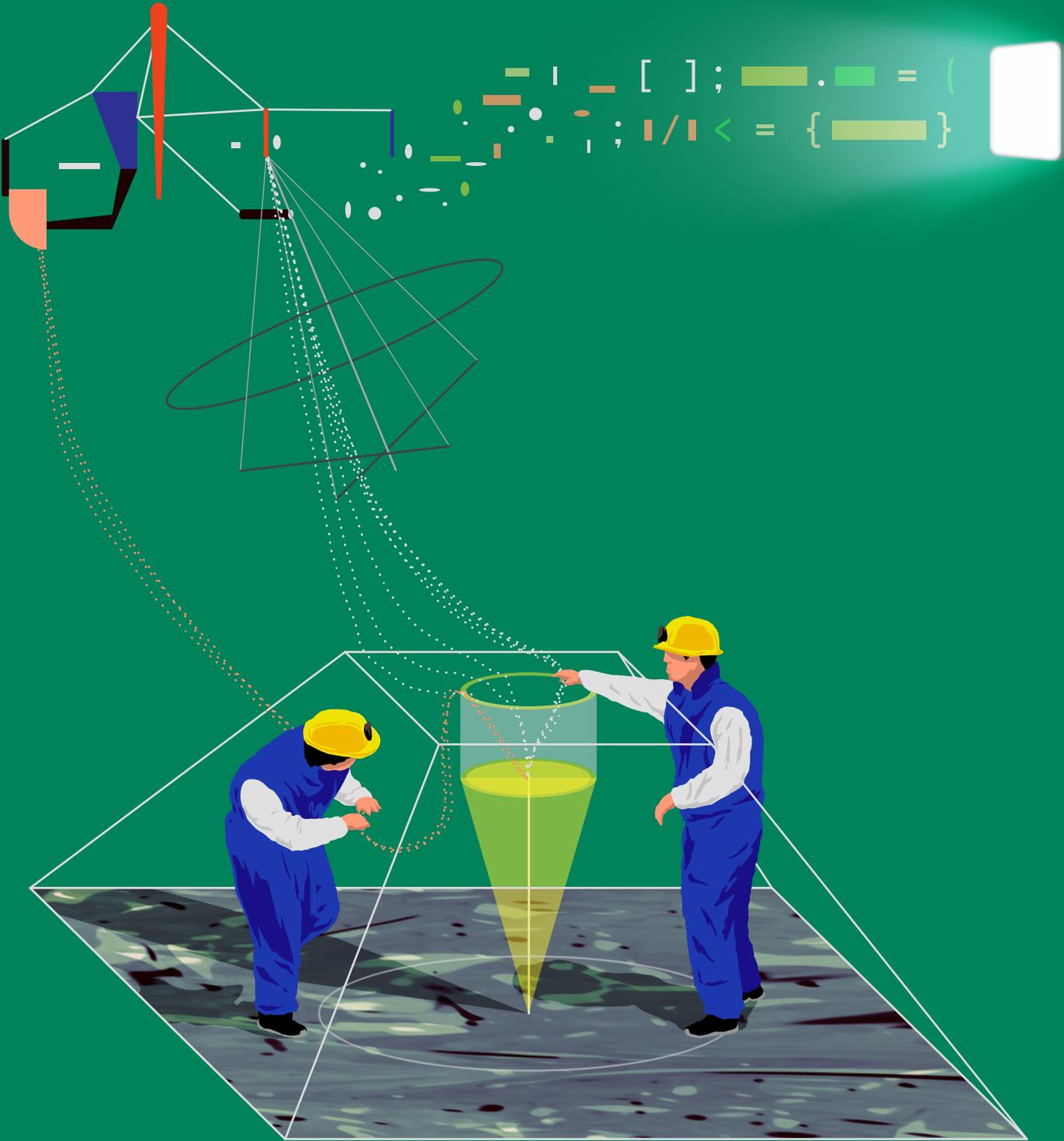


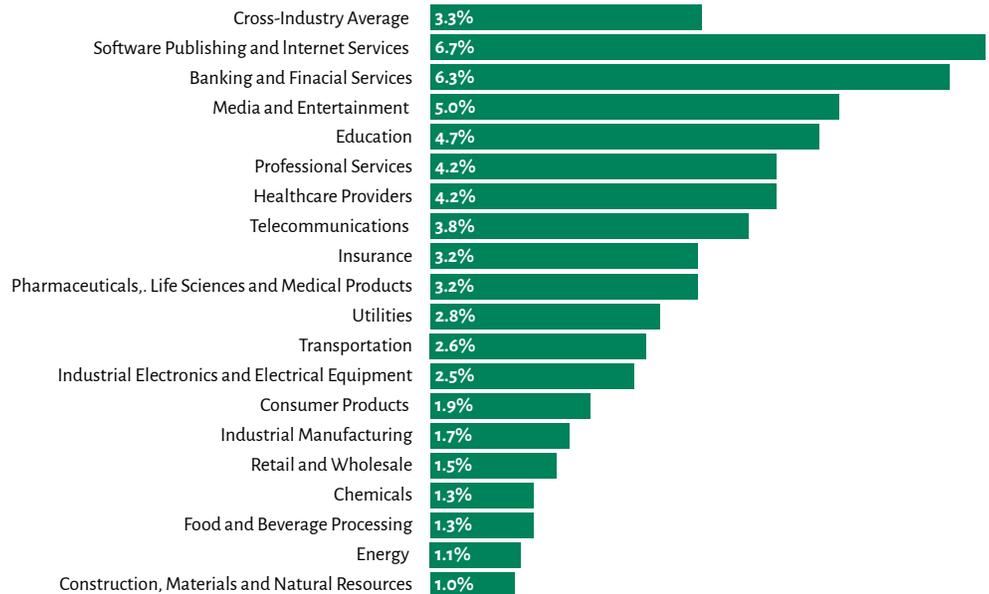
Why Technology Will Spur The Second Industrial Revolution



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Venture capitalists have largely avoided the industrial technology space due to concerns about long sales cycles, sector resistance to change, cumbersome distribution channels, and uncertain exits. However, the lack of evolution and innovation in this space portends the coming of a “golden-era” of upgrades — similar to what we’ve seen in other antiquated sectors. And while current large industrial players recognize the opportunity, they lack the culture and flexibility to capitalize on it. Economic necessity will continue to accelerate this change, presenting a significant opening for venture backed technology companies to drive new capabilities and efficiencies in verticals where IT spend as a percentage of revenue is amongst the lowest.¹

IT Spending as a Percent of Revenue, by Industry



Source: IT Key Metrics Data 2014, Gartner Benchmark Analytics

¹ IT Key Metrics Data, Gartner Benchmark Analytics

What is Industrial Tech?

We define industrial technology as the application of software platforms and hardware to reduce manufacturing costs, create new capabilities, and optimize equipment performance.

Specifically, the value propositions include:

- real-time monitoring and data driven decision-making,
- predictive maintenance,
- increasing asset utilization,
- reducing operating costs & times,
- minimizing raw materials usage,
- and better safety / compliance.

For industrial companies, applying industrial technology effectively will drive cost savings through the optimization of their assets, as well as bring revenue from novel business models. For example, Yard Club (funded by a16z and acquired by Caterpillar in May 2017), allows industrial companies to rent (rather than own) manufacturing equipment, similar to how businesses leverage cloud services today. By renting equipment, industrial companies can reduce upfront capital investment and position themselves for growth.

The most interesting technology companies in industrial technology monetize value from actionable insights generated from novel datasets. They are not reliant on “big data” moonshots built upon far-reaching innovations that will struggle for years to become economically viable. Instead, they pull from the APIs of existing equipment and inexpensive off-the-shelf sensors / actuators at the “edge.” The “edge” includes individual machines within factories and remote equipment such as engines, oil wells, refineries, power plants, and commercial HVAC systems. Sensors have been used on industrial machinery for decades to measure physical properties including temperature, pressure, chemical composition and velocity. However in the past, sensors were stand-alone devices providing one-off readings rather than connected devices utilized for real-time data analysis.

A Trillion Dollar Market Opportunity

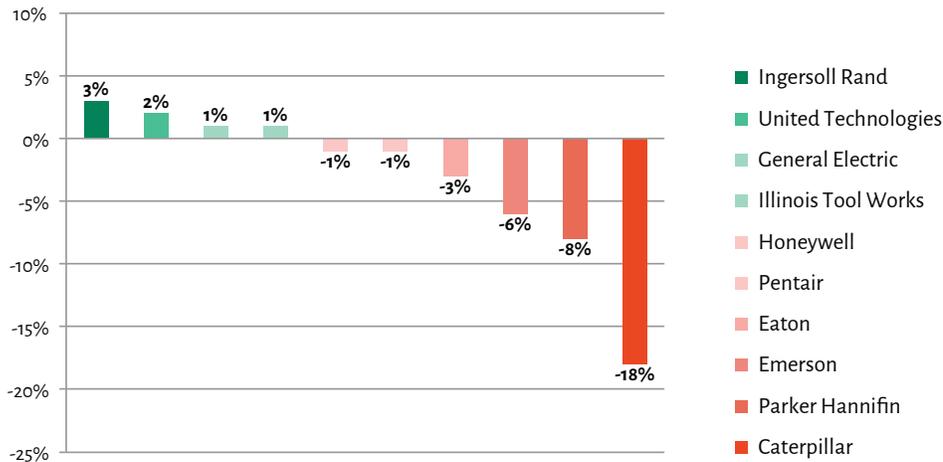
Our conservative estimate of the market is several hundred billion dollars annually within the next few years. As a guidepost, annual CapEx and COGS spending by publicly traded U.S. manufacturing companies is roughly \$750 billion and over \$4 trillion, respectively, and significant industrial technology investments will be targeted at both categories. Additionally, analysis by the McKinsey Global Institute in 2015 estimated the economic impact in the factory setting alone to be \$1.2 - \$3.7 trillion per year (globally) by 2025.

Incumbent Industrial Players Are Stagnating

Technology disruption is now occurring in manufacturing supply chains driven by pressure on industrial companies to improve productivity, reduce costs, and find growth. While industrial company stock prices have rallied since the financial crisis, the catalysts have been traditional cost-cutting and share repurchases as top-line growth has been stagnant due to weak industrial demand in many verticals. Boards and shareholders of incumbent industrial companies are increasingly focused on the disruptive threats from software and technology and are forcing CEOs to rapidly develop and implement appropriate investments and strategies. The departure of Ford's CEO recently is one example of a board asserting itself in this regard.

Organic Revenue Growth - Fiscal Year 2016

Selected Industrials



Source: Company Filings



As a result, interest in technology to reduce costs and spur growth has exploded. To highlight the distinction, unlike healthcare IT where the implementation and financial returns from EMR took years, industrial technology is far less vulnerable to shifting regulations and market structure uncertainty.

While there is significant market noise on this topic, we believe we are still in the early stages of the evolution. For example, while GE expects to grow Predix to \$4 billion of annual revenue by 2020, Predix had ~\$50 million of revenue in 2016 despite being a leader in the category. United Technologies Corporation, focused on aerospace and building control & security, has been actively supplementing its IIoT strategy with initiatives ranging from launching a \$300M “big data” tech hub in Brooklyn, NYC, to acquiring the building analytics player EcoEnergy. Honeywell is leveraging a company-wide IIoT platform called Sentience to drive optimization and automation to customers in its home & building, performance materials, safety, and aerospace businesses. Sentience drove \$4 million in savings in 2016.²

Entrepreneurs Can Develop Important Platforms Today

The typical big-company innovation roadmap of partnering with IBM, Microsoft, and academic institutions like Georgia Tech rarely yields meaningful improvements. For example, many shareholders are expressing skepticism about the significant dollars being spent by GE on internal digital initiatives, questioning not the opportunity or the technology but whether industrial incumbents are the right players to exploit it. We believe true innovation will occur through venture funded technology companies. Large industrial companies often lack the culture, agility, financial freedom (focus on near-term ROIC), and talent pool to successfully execute in-house.

For example, C3 IoT, founded by Thomas Siebel provides large industrials in oil and gas, manufacturing, aerospace, defense, and healthcare with a full-stack IoT development platform as a service (PaaS) for insights on predictive maintenance, fraud detection, supply chain optimization, and asset planning. Compared to GE Predix’s 2016 forecast of 500K connected devices or Siemens’ 200K devices under management, C3 IoT is several years ahead of established competitors, who cannot maintain its pace of innovation.³

² Honeywell 2017 Investor Conference Presentation (Slide 107/174), March 1, 2017.
<http://investor.honeywell.com/IRW/event/4121346>

³ “C3 IoT: Is Tom Siebel’s Startup An Emerging Powerhouse?” by Charles Babcock, 8/10/2016.
www.informationweek.com/iot/c3-iot-is-tom-siebels-startup-an-emerging-powerhouse/d/d-id/1326537



Motive Drilling is a venture backed software player in the oilfield services space. Funded by GE, Hunt Oil, and BUILDERSVC's precursor fund Formation 8, Motive connects into the operations of existing drilling rigs to optimize directional drilling decisions via data analytics, drilling dynamics, and economic modeling. The system provides turn-by-turn downhole navigation guidance over miles of vertical and horizontal drilling, resulting in the most efficient drilling costs and maximum production impact. The largest independent oil companies have experienced 50% reduction in directional drilling costs as a result of Motive's technology.⁴



Exits Can Be Robust and Lower Risk

The exit potential of industrial technology companies is clouded with misperceptions that it is too difficult to build a company of scale in the space and valuations are not compelling. In fact, recent examples prove otherwise. GE alone has acquired ServiceMax (\$915 million; estimated 10x revenue multiple), Bit Stew, Wise.io, Daintree Networks, and Wurldtec. Cisco too has been highly acquisitive, including its acquisition last year of Jasper Technologies (\$1.4 billion; estimated 10x revenue multiple). Certain verticals such as oilfield services have robust annual M&A activity, with companies driving new capabilities or enhancing production efficiency routinely acquired at attractive multiples. Public equity markets are also receptive to high growth, high margin industrial technology companies and award them high valuation multiples. One example is Aspen Technology, which makes optimization software for supply chain applications in process industries (particularly oil and gas and chemicals). Aspen has a \$4.3 billion market cap and trades at 9x revenue.

Investing In The Opportunity

While the arguments for investment in industrial technology center around 1) an antiquated industry ripe for technology improvements, 2) strong value proposition creating economic benefit, 3) large industrial players who recognize the need but are slow to move, and 4) attractive exit opportunities providing optionality for investors and entrepreneurs, most venture investors will continue to avoid this space. The lack of understanding around customer behavior and the need to get out of Silicon Valley, Boston, and LA to visit companies in Dallas, Detroit, and Alpharetta will deter all but those who have strong conviction in the opportunity.

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⁴ <http://www.motivedrilling.com/case-studies/eagle-ford-s-texas>

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