ARRAYWORKS℠

Data Science — The New Frontier for Process Excellence

A Roadmap to Creating Your Digital Advantage

Executive Summary

Insights are the New Currency in a Data-Driven Economy

In January 2016, leading economists from the World Economic Forum announced that we are entering the 4th Industrial Revolution: The Cyber-Physical Age.[i] Although this era of extreme connectivity and automation will bring untold wealth and equity to organizations positioned to take advantage of the opportunity, survival requires leaders to reengineer the way they've done business to this point.

The 4th Industrial Revolution is forcing companies to make radical changes in their business models, operations, infrastructure, governance, and risk strategies in order to emerge prosperous. Today's business leaders are under tremendous pressure to recognize the rapidly changing environment, challenge existing methodologies, and ceaselessly innovate. In the simplest terms, net gains of competitive advantage will be realized and measured by the degree to which leadership can distill any measure of game-changing **insight** from the ever-expanding ocean of data this new era will produce.

Two of the main barriers to change, however, are the critical shortage of certain skills and the complexity of systems necessary to derive insights from today's tsunami of data. The solution requires a two-pronged approach: build an army of resources with the right talent and arm them with the right tools.

This white paper will illustrate the gaps in talent and technology that must be bridged to compete, and outline a pathway that integrates new professional capabilities with emergent technology to gain keen insights and digital advantage in a data-driven economy.

i Schwab, Klaus, "How can we embrace the opportunities of the Fourth Industrial Revolution?", World Economic Forum, Jan 2016; accessed Nov 2016, https://www.weforum.org/agenda/2016/01/how-can-we-embrace-the-opportunities-of-the-fourth-industrial-revolution/

Implications of the 4th Industrial Revolution

4th Industrial Revolution

With billions of people (and things) connected by sensors and devices, and the unprecedented processing power, storage capacity, and access to knowledge, the possibilities are unlimited.

1784 - The 1st Industrial revolution began in Britain in the 18th Century, harnessing water and steam to mechanize production equipment.

1870 - The 2nd industrial revolution arrived in the 19th Century, with electricity enabling mass production and a division of labor.

1969 - The 3rd industrial revolution combined the use of electronics and information technology to automate production.

201? - The 4th industrial revolution is referred to as the Cyber-physical age, characterized by today's pervasive connectivity, vast amounts of data, and unparalleled breakthroughs in technologies.

Source: The Fourth Industrial Revolution: what it means, how to respond: Klaus Schwab, Founder and Executive Chair, World Economic Forum, Thursday 14 January 2016

The 4th Industrial Revolution is the integration of our physical world with the digital world through the proliferation of sensors and devices connecting everyone and everything. It signals that a tipping point has been reached. The World Economic Forum points to the velocity, scope, and systems impact as the elements that differentiate this as a new era and not a continuation of the previous Computer Age. The current pace of innovation is unprecedented in history and we are now evolving at an exponential rather than a linear rate. The impact is felt by every industry across the globe, and the resulting disruption is already transforming how we do business, how we govern, and how we live our daily lives.

Throughout this era of sweeping change, one thing will remain constant: Economic models will remain inexorably linked to advancements in technology, the net result of which will open tremendous opportunities for business growth. Digital organizations will remain Customer-focused; but instead of asking what the Customer wants, they must watch what the Customer does and anticipate their needs.

Forward thinking companies will take advantage of the new market dynamics and leverage the emerging paradigm shifts that characterize this exciting period of economic history. To better understand these opportunities, let's first explore the confluence of technological priorities influencing successful strategies and outcomes including:

- Internet of Things (IoT)
- Big Data
- Infonomics
- Algorithmic Business

The New Technological Imperatives

Internet of Things (IoT)

IoT refers to enabling everyday objects for Internet connectivity to produce some form of data-centric utility. Industry experts predict that roughly 6.4 billion connected "things" worldwide will be in production by the end of 2016, a 30 percent increase from 2015. This number is expected to mushroom to more than 20 billion by 2020.[ii]

Most companies are unprepared to derive value from the flood of data that these inter-connected objects produce; yet companies that can successfully parse the data deluge will differentiate themselves and profit.

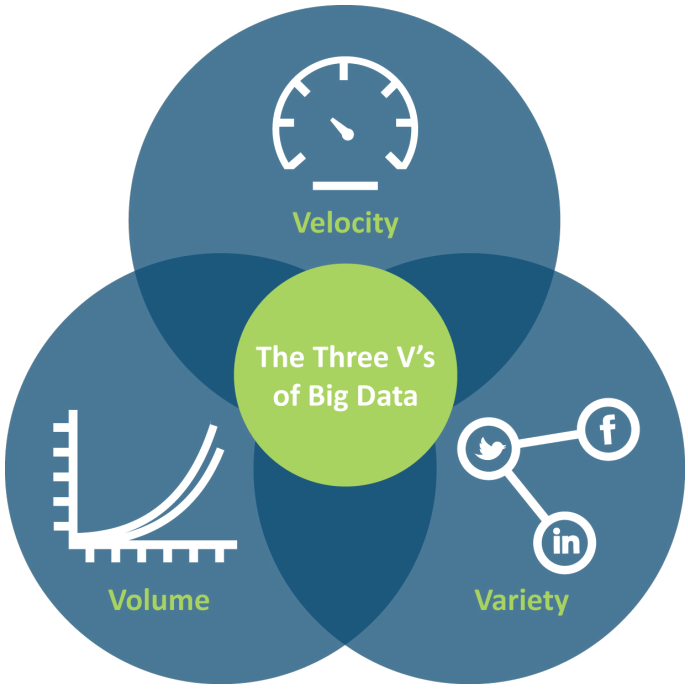
Many of the IoT initiatives we've seen so far have focused on cutting operational costs and boosting supply chain efficiency (e.g., monitoring technology, tracking assets via GPS, reading meters remotely, etc.) If you can provide a compelling case for economic payback based on cost savings, then it's an easy sell. Cost reduction is most often entirely within the control of the enterprise and is usually easier to quantify. Comparing costs and calculating ROI is much more straightforward than proving that you can increase revenue.

However, the greater long term value of sensor technology lies in a granular, more detailed view of Customers and the experiences they find compelling.

ii "Gartner Says 6.4 Billion Connected 'Things' Will Be in Use in 2016, Up 30 Percent From 2015", Gartner Group, Nov 2015; accessed Nov 2016, http://www.gartner.com/newsroom/id/3165317

Big Data

Big Data refers to data sets that are so large and complex that traditional data processing applications are inadequate. Analyst and technology futurist Doug Laney defined Big Data as being three-dimensional, a concept commonly referred to as the 3 Vs. It includes **volume** or the amount of data, **velocity** or the speed at which the data is created, stored, analyzed and visualized, and **variety** or the array of data types and sources.



Due in large part to the Internet of Things, data will continue to grow along all dimensions as more data sources are recognized and connected. According to Forbes, by the year 2020 an estimated 1.7 megabytes of new information will be created every second for every human being on the planet.[iii] Vast amounts of data is no longer a new phenomenon and soon the term "Big Data" will fade into the background and we will return to just calling it "data." Storing the volume of data is also no longer an issue as cloud computing and software-defined infrastructure have lowered the barrier to entry for organizations to exploit big data.

"Less than one half of one percent (0.5%) of the data collected is ever analyzed and used."

At this time, less than one half of one percent (0.5%) of the data collected is ever analyzed and used[iv]. This bears repeating: over 99.5% of all data captured globally has yet to be explored. Therein lies the opportunity. With so many high value breakthroughs already achieved with what little data has been analyzed so far, the insights and resulting revenue hidden within the rest is almost unimaginable.[v]

Capturing data is one thing, however monetizing it is quite another.

[iii] Marr, Bernard, "Big Data: 20 Mind-Boggling Facts Everyone Must Read", Forbes, Sep 2015; accessed Nov 2016, http://www.forbes.com/sites/bernardmarr/2015/09/30/big-data-20-mind-boggling-facts-everyone-must-read/#5630d11a6c1d

[iv] ibid

[v] ibid

Infonomics

> "By 2020, 10% of organizations will have a highly profitable business unit specifically for productionizing and commercializing their information assets."

Laney also coined the term "Infonomics" to represent the intersection between "information" and "economics" in the quantification of data assets. He predicted the future trend to quantify the value of information and how to manage it as an actual enterprise asset.[vi]

Infonomics has matured over the past two decades into the discipline of converting information into economic value. It provides the framework for firms to measure, manage, and monetize information as a first-class citizen alongside all other revenue-generating or cost-saving assets. As such, companies must employ quantitative asset optimization principles to guide how to handle, value, and deploy their digital assets for maximum return. Forward-thinking firms have already begun this practice. By 2020, 10% of organizations will have a highly profitable business unit specifically for productizing and commercializing their information assets.[vii]

The opportunity to monetize information goes well beyond the actual data points. Many modern data sets are so rich in terms of dimensions, trends, and hidden differentiators that companies need complex analytical algorithms to produce actionable insights. **It is this notion of "algorithmic business" that is vital for growth in the 4th Industrial Revolution.**

Algorithmic Business

Algorithmic Business is the mechanized use of complex mathematical algorithms to drive improved business decisions or process automation as a competitive differentiator. Algorithms transforms data into action. This is where the true value of big data lies. Industry experts predict that going forward "companies will be valued not just on their big data, but on the algorithms that turn that data into actions and impact Customers."[viii] Organizations are increasingly recognizing that algorithms are a growing business opportunity.

Although algorithms are not new, vast and rich data sets and tremendous processing power are contributing to our ability to systematically capture information, transform it into knowledge, and package it to be repeatable and reproducible.

[vi] Infonomics, Wikipedia, 2016; accessed Nov 2016, https://en.wikipedia.org/wiki/Infonomics

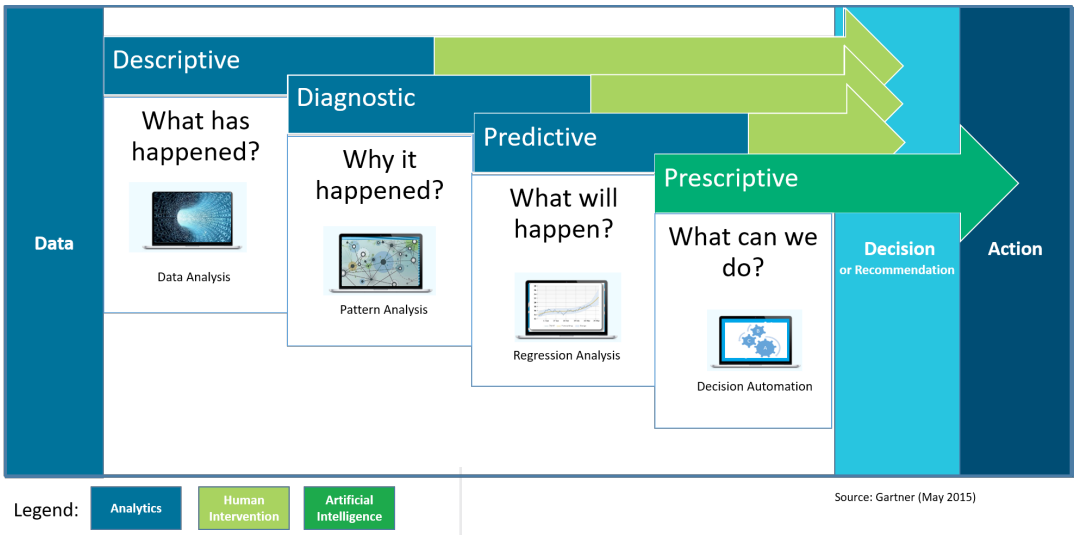
[vii] Laney, Douglas "Gartner's Enterprise Information Management Maturity Model", March 2016 https://www.gartner.com/

[viii] Pemberton Levy, Heather, "The Arrival of Algorithmic Business", Gartner Group, October 2015; accessed Nov 2016, http://www.gartner.com/smarterwithgartner/the-arrival-of-algorithmic-business/?utm_source=datafloq&utm_medium=ref&utm_campaign=datafloq

The first iteration of the algorithm is the automation of the existing process. Eventually however, the algorithms themselves will become smart by learning from experience and producing results previous decision makers never expected.

The Internet of Things, Big Data, Infonomics and Algorithmic Business all require organizations to build new core competencies within their existing employee base. Deriving valuable insights from data and communicating their usefulness to corporate executives requires a special class of highly educated professionals that are in great demand and short supply: the data science professional.

The Rise of the Data Scientist and the Talent Gap that Must Be Filled



Source: Gartner (May 2015)

In the simplest terms, Data Science is the transformation of data into actionable insights. It is a multi-disciplinary blend of data inference, algorithm development, and technology focused on solving analytically complex problems. **What differentiates data science from traditional data analytics is the focus on future outcomes, decision making, and the elimination of human intervention in the process.**

Traditional analytics describes what happened in the past and diagnoses why it happened. Data Science continues this process organically - analyzing data to predict what will happen next and what we can proactively do to take advantage of it. The paradigm shift is that true data-driven decision-making happens when decision makers step aside and allow the data to make the decisions.

Companies have spent millions upskilling employees to have a process excellence mindset. Data science can be seen as the continuation of this mission, with more emphasis on the data-centric focus.

The emerging field of data science is the intersection of social science and statistics, information and computer science, and design. Many of the tech-centric breakthroughs we consider commonplace today began as little more than a heap of unstructured data in a company server. For example, Amazon's recommendation engine suggests items for you to buy determined by their algorithms. Netflix recommends movies. Spotify recommends music.

Gmail's spam filter is the product of data – an algorithm behind the scenes processes incoming mail and determines if a message is junk or not. Computer vision used for self-driving cars is also a data product – machine learning algorithms are able to recognize traffic lights, other cars, pedestrians, and obstacles on the road.

Results like these have earned data scientists a high place in the job market. Executive leaders would like nothing better than to hire these valuable analytics specialists for their companies. However, data scientists have a set of skills and talents so rare that they are often referred to as "unicorns." There simply aren't enough of these highly skilled professionals.

According to a study by the McKinsey Global Institute, by 2018 the United States alone could face a shortage of 140,000 to 190,000 data scientists. In addition, they predict a shortfall of 1.5 million managers and analysts with the know-how to use the analysis of big data to make effective decisions. [ix]

This puts the digital enterprise in a precarious position. Executives have invested very heavily in big data generation and capture processes; but without qualified experts that can derive value from the vast amounts collected, the return on that investment will be near zero resulting in missing one of the greatest opportunities for differentiation in our lifetime. This has left business leaders scrambling for ways to turn their big data into big business value, with or without the elusive data scientist.

[ix] Manyika, James, "Big data: The next frontier for innovation, competition, and productivity", McKinsey Global Institute, May 2011; accessed Nov 2016, http://www.mckinsey.com/business-functions/digital-mckinsey/our-insights/big-data-the-next-frontier-for-innovation

Additional Hurdles to Success

In addition to a critical shortage of resources, there are two other areas where leaders need to focus to be successful: understanding the true definition of data-driven decision making and enhancing their organization's ability to collaborate.

Data-Driven Decision Making

One of the challenges facing organizations today is that too many decision makers still believe that data-driven means reviewing data prior to making a decision. In a 2014 study conducted by The Economist Intelligence Unit (EIU), executives were asked to identify their management decision-making style. 17% identified their style as empirical and 42% identified their style as data-driven. Only 10% of executives identified their management decision-making style as intuitive.[x]

However, Gartner studied executive decision-making in 2015 and concluded that through 2020, more than 95% of business leaders will continue to make decisions using intuition, instead of probability distributions, and will significantly underestimate risks as a result.[xi]

To be truly data-driven, leaders must step out of the way and allow the data through algorithms to make routine decisions. For more complex decisions, leaders must seek insights from data to drive their decisions and weight the results of data analytics heavily in decision-making.

Collaboration

The growing dearth of trained data science resources in the labor market is paving the way for other professionals to bring their skills and ambitions to bear in the digital enterprise. Industries and organizations are increasingly using a team approach to capturing value from large data volumes by creating small cross-functional teams explicitly charged with delivering tangible and measurable data-driven benefits in relatively short periods of time.

[x] The Economist Intelligence Unit, "Decisive action: How businesses make decisions and how they could do it better", February 2014; accessed Nov 2016, https://www.eiuperspectives.economist.com/sites/default/files/Decisive%20Action%20-%20How%20businesses%20make%20decisions.pdf

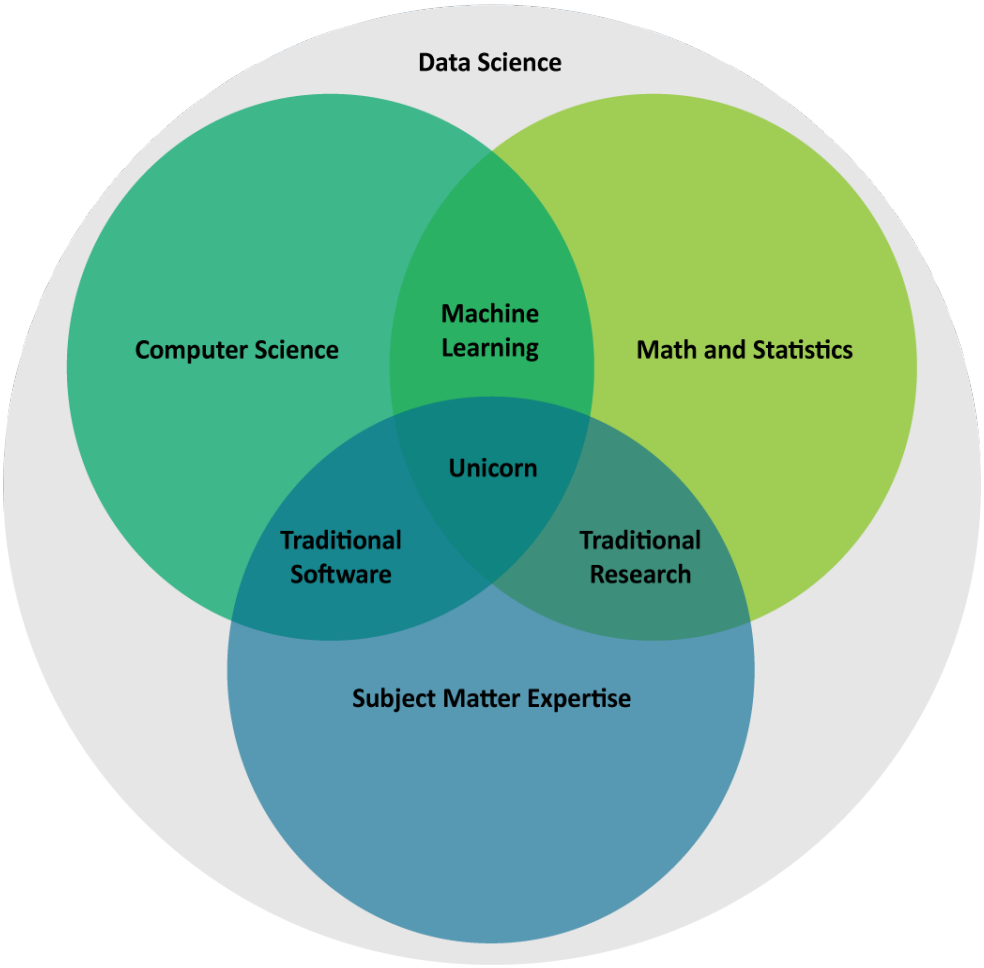
[xi] Laney, Doug, et. al., "Predicts 2016: Analytics Strategy", Gartner Group, December 2015; accessed Nov 2016, http://www.gartner.com/document/3177320

The collaborative approach to data science makes sense given the complexity of 21st century business and technology. Although at one point in history it was possible to know everything, the current breadth and depth of knowledge is such that it is no longer possible. Experts believe that the last person to know everything was born in the mid-nineteenth century.[xii] Since then it is agreed that the body of "known knowledge" had become so large that it was no longer possible for one person to know everything.

At this point, there is nothing more important to leadership and organizational success than collaboration. It exponentially increases the odds of ground breaking innovation. But it can be tough to achieve.

In a research study conducted by Harvard Business Review in early 2016, they were surprised to find that efforts to adopt analytics failed in a majority of cases due to an upset in the balance of power in the C-suite. "Frankly, the results surprised us: Only a little more than one in three of the three-dozen companies that we studied met the objectives of their analytics initiatives over the long term. Clearly, driving major innovations with analytics was harder than many executives expected."[xiii]

Many businesses are exploring new C-suite roles, such as chief data officer and chief analytics officer, to create accountability for the oversight and coordination of the organization's data management, analytics, business intelligence, and the governance of data as a business critical asset.



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[xii] Heilbroner, Robert L. (1999). The Worldly Philosophers: the Lives, Times, and Ideas of the Great Economic (Thorstein Veblen, Quote: he became known as "the last man who knew everything", pg. 241). Simon and Schuster.

[xiii] McShea, Chris, Oakley, Dan, and Mazzei, Chris. "The Reason So Many Analytics Efforts Fall Short." August 29, 2016; access on November 2016, https://hbr.org/2016/08/the-reason-so-many-analytics-efforts-fall-short

How Companies Can Respond

A recent article in the New York Times reported that those currently in Data Science roles were spending 50-80% of their efforts on activities that did not require their specialized education.[xiv]

This, combined with the critical global shortage of these highly trained specialist, opens a tremendous opportunity for those who use data to solve problems but don't have an advanced degree in this area.

The good news is that most companies already employ professionals with sufficient skills to make a successful transition. Many of these professionals have been working with their firms for many years and possess intimate familiarity with their companies' business models. With a moderate skills upgrade, they can perform much of the work that pure data scientists do today with the possible exception of programming.

In a recent study conducted by the team at Ambient Intelligence, Inc. it was determined that the skills of **Lean Six Sigma professionals, for example, fulfill 70% of those needed to be a successful Citizen Data Scientist** (see: Case Study – Ambient Intelligence, Inc.) "Companies have spent millions upskilling employees to have a process excellence mindset. Data science is the continuation of this mission with more emphasis on data. Therefore, it makes sense to leverage the existing investment and focus on enhancing the skills of this population to add value in the least amount of time with the least amount of investment," said Marie Clark, Founder and CEO, Ambient Intelligence, Inc.

The Citizen's Advantage: A Data Science Multiplier

The demand for Citizen Data Scientists is predicted to increase five times more quickly than the demand for pure data scientists with advanced degrees. By 2019, Citizen Data Scientists are expected to surpass the more credentialed Data Scientists in the amount of advanced analysis produced. [xv]

[xiv] Lohr, Steve, "For Big-Data Scientists, 'Janitor Work' Is Key Hurdle to Insights", Aug 2014; access in Nov 2016, http://www.nytimes.com/2014/08/18/technology/for-big-data-scientists-hurdle-to-insights-is-janitor-work.html?_r=0

[xv] Tapadinhas, Joao, Idoine, Carlie J., "Citizen Data Science Augments Data Discovery and Simplifies Data Science", December 9, 2016; accessed in Dec 2016, https://www.gartner.com/document/3534848

The retail giant Sears recently illustrated this point by empowering 400 staff from its business intelligence (BI) operations to execute a major Customer segmentation initiative – work which they would have asked highly skilled data scientists to perform. By shifting the work to their citizen staff, they reported saving hundreds of thousands of dollars in prep work alone.[xvi]

While the emerging role of the Citizen Data Scientist offers a viable alternative, many executives remain skeptical of the notion that this expertise can be delivered by an internal resource through a targeted educational program. In reality, the Citizen Data Scientist can actually become highly effective by combining their business acumen and their intimate knowledge of the organization with their new skills.

Citizen Data Scientists are outcome multipliers. They dramatically increase analytic capabilities while reducing the cost of human capital by as much as 40%. For example, if you partner a single Data Scientist with four Citizens, they can effectively produce the same outcomes as five PhD level Data Scientists. In the context of collaboration described earlier, the Citizen Data Scientist becomes an essential member of the digital team.

[xvi] Marr, Bernard, "How the Citizen Data Scientist Will Democratize Big Data", Forbes, Apr 2016; accessed Nov 2016, http://www.forbes.com/sites/bernardmarr/2016/04/01/how-the-citizen-data-scientist-will-democratize-big-data/#1392a54a4557

Data Team Roles

Data Scientist
Operates where no packaged software exists (open source)
Applied Mathematics
Statistical Modeling
Decision Algorithms
Bayesian Inference
Machine Learning (ML)
Design of Experiments

Citizen Data Scientist
Uses smart data discovery tools
Business Acumen
Data Preparation
Basic Statistics
Storytelling
Visualization
Analytic Guidance

Data Engineer
Streamlines Data Supply Chain
Domain Expertise
Catalogs Data Sources
Complex Data Preparation
Initial Data Exploration
Data and Analytic Governance
Metadata Management

Data Developer
Custom Coding
Complex Data Preparation
Advanced SQL
Repeatable Data Transformation
Specialized Visualizations
Deployment of models, algorithms and ML

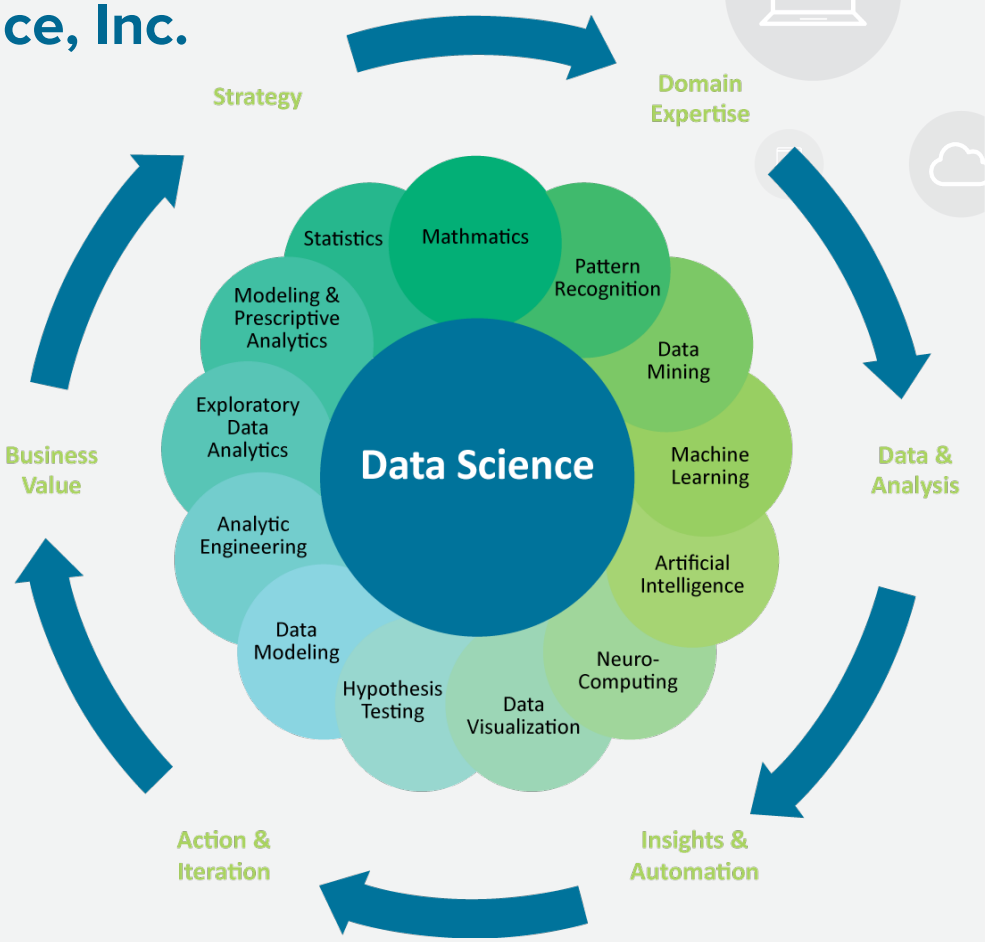
Ambient Intelligence, Inc.

CASE STUDY

Ambient Intelligence, Inc, with offices in San Francisco, New York and Boston, trains analytics professionals around the world to assume the role of Citizen Data Scientists. One of their clients, a Fortune 50 healthcare company, employed process excellence professionals to improve healthcare delivery operations. However, the company found itself increasingly unable to secure and analyze project data themselves, forcing them to rely on the department's data management practice to support process improvement initiatives.

The company engaged Ambient Intelligence, Inc. to assess current operations, evaluate possible solutions to support self-service analytics and reduce their dependence on the data management practice to support operations.

To meet this objective, Ambient Intelligence determined that the company suffered from a severe shortage of trained data science professionals necessary to improve critical business processes. But rather than recruit and hire expensive degreed data scientists (also in short supply), Ambient Intelligence discovered that the company already employed highly capable process improvement professionals, who possessed 70% of the skills required to successfully fill the role of Citizen Data Scientist. Knowing that it is nearly impossible to derive valuable business insights without deep business acumen and domain knowledge, Ambient Intelligence recommended that the company focus its efforts on upskilling its existing process improvement workforce.



Ambient Intelligence created a program of ongoing training and team collaboration, which not only upgraded the process professionals' skills, but also re-empowered the new Citizen Data Scientist to secure and analyze project data themselves, reducing dependence upon the data management practice.

Overall, Ambient Intelligence's solution boosted morale and the team's interpersonal relationships. 90% of participants felt that the program helped them achieve growth and development in their current role. 82% of participants reported having already applied their new skills on project assignments.

The biggest takeaway was that upgrading the skills of existing process excellence professionals produced more effective results, as compared to recruiting scarce and costly data scientists from the outside.

http://ambientintelligence.co

What Would Jack Do?

In 1995, Jack Welch, then CEO of General Electric, declared that GE would be a six sigma company within five years. Many of GE's core business processes functioned very inefficiently. Others barely function at all. Welch knew that he needed trained data-centric business process analysts to examine and diagnose the issues the company was experiencing and implement process improvements. There was just one problem. In 1995, there were very few professionals in the job marketplace who possessed the skills required to make this happen.

Rather than hire battalions of outside consultants, none of which possessed the complete spectrum of the competencies required to realize his vision, he decided to build his own army of skilled professionals from within GE's own ranks.

All salaried GE employees were required to complete 100-hour training program in Six Sigma methodologies and complete at least one Six Sigma project by the end of fiscal year 1998. Topics ranged from process definition to inputs analysis to output measurement and control. Welch also required follow-up training to reinforce these valuable skills.

GE's results were nothing short of amazing. With the support of top management and an emphasis on mentoring, GE saved **$700 million** in the first two years. Over the five-year course of GE's entire six Sigma transformation, the company realized an overall cost savings of **$12 billion**.

Welch proved that consistent business improvement yields positive financial results. And in the process, he proved that when a company needs people with special skills that are difficult or impossible to find, upskilling existing employees already familiar with company business models is a winning strategy.

Build Your Own Army

Clearly, data-driven teams fill the enterprise's need for advanced analytical talent at a fraction of the cost. This strategy is too compelling to ignore; how then should the enterprise proceed?

The wisest course of action requires a two-pronged approach — one that calls for the aforementioned skills upgrade bolstered by judicious investment in the emergent technology that will multiply their effectiveness in the midst of a data science project. Executives looking to outfit their companies with Citizen Data Scientists should keep the following guidelines in mind.

- **Retain** existing talent. Buying talent in the current job market is simply not a viable strategy. Even if it were, this option fails to capitalize on the citizens' pre-existing business experience and intimate business model familiarity

- **Train** Citizen Data Scientists based on their existing aptitudes and abilities. Every candidate approaches the role with a different set of baseline skills. Categorize them into groups with similarly-skilled employees and train them in waves. This way, firms can maximize their training investment and bring the new scientists up to speed with similar ability levels at the same time.

- **Collaborate** with new team members. Data science is a team sport and some project tasks require greater analytic skills than others. Assign work to the team members best able to fulfill the missions of data scrubbing, extract-transform-load (ETL), and insight extraction. Cycle team members through each of the data science job profiles across projects. This ensures that each team member gains a measure of experience with each function, which improves team versatility.

With these guidelines in mind, executives can go a long way toward filling their much-needed data science vacancies with the people most capable of assuming the role. And while these upgraded professionals will most likely find themselves juggling responsibilities within a matrix reporting structure, their mere presence improves the odds that their companies will gain at least some measure of value from their investment in Big Data — a much better outcome than if they wait for universities to turn out enough data scientists to go around and then invest in training them on the necessary business acumen and domain knowledge.

Organizations can amplify the success of their newly minted digital teams by arming members with the emergent systems and tools designed to support the evolutionary nature of digital industry.

Without action, the promised value of data science is lost.

Capitalize on Advancements in Technology

Managing the intersection of domain knowledge, process knowledge, and data analytics will be critical to digital business going forward. To yield an actual competitive advantage, OpX will need to leverage the results of data analytics and tie them back to the processes used to deliver on those insights. **Without action, the promised value of data science is lost.**

In the greater context of Digital Business Ecosystems, a hallmark of the 4th Industrial Revolution, every organization needs a digital platform strategy to engage, integrate and collaborate with a growing community of participants across a network of connected enterprises. There is a complexity in explaining platforms and the new business models that leverage ecosystems which we covered in an earlier whitepaper "Digital Business Ecosystems". In brief, platforms and ecosystems go hand-in-hand. Platforms are the critical foundation that provides a gateway for the fluid exchange of data, insights, and value in the digital economy.

Low-code development platforms have already taken center stage, fueling amazing digital transformations in the world of business process management by empowering executives, domain experts, and AD&D teams to accelerate and manage the velocity of process change through the use of software configuration tools that eliminate the need for hand-coding. These "declarative tools" have captured the attention of industry leaders and analysts as the ability to rapidly deliver the continuous enhancement of the applications built on these platforms is a game changer on its own.

While significant differences become meaningful in selecting a platform, as outlined in our whitepaper "Agile Isn't Agile Enough for Opx in the New Economy", an innovative paradigm shift in the architecture of these low code engines now makes it possible to unify data, process, systems, and people –in entirely new ways. This advancement in architecture creates the ability to model complexity, communicate and collaborate with remote stakeholders, gain consensus, and then swiftly deploy automated solutions that not only tie insights to action, but to real-time feedback that enables and enriches continuous improvement.

Manage the Lifecycle of the Analytic Process

Of course our confidence level in the algorithmic decisions produced by Data Science ultimately rests on the accuracy and precision of the underlying data and methodologies used to produce the analysis.

Most professionals in the data science community are all too familiar with the infamous story of 2013 when a 28-year-old grad student disrupted the Global Austerity Movement by exposing mathematical errors contained in an economic model that had been widely used for years.[xvii] The 2016 U.S. Presidential Election was an equally stunning example of the catastrophic effect of poor analytic predictions, when the Dow tumbled as much as 800 points overnight as Wall Street scrambled to react to the surprise result.[xviii]

For data science teams **the paradigm shift in platform architecture presents an opportunity to gain greater control and visibility at every stage of the analytic lifecycle and to mitigate risk** while enabling an accelerated pace of purpose-driven exploration.

[xvii] Roose, Kevin, "Meet the 28-Year-Old Grad Student Who Just Shook the Global Austerity Movement", New York Magazine, April 18, 2013; accessed Nov 2016, http://nymag.com/daily/intelligencer/2013/04/grad-student-who-shook-global-austerity-movement.html

[xviii] Shell, Adam, "Stocks rebound after scary overnight sell-off; Dow up more than 100", USA Today, November 9, 2016; accessed Nov 2016, http://www.usatoday.com/story/money/markets/2016/11/09/global-markets-tailspin-trump-victory-declared/93531114/

Frameworks

A key advantage of these platforms, independent of any specific project, is their ability to provide a container to build flexible frameworks that create a rich and dynamic organizing principle for classifying the multitude of variables inherent in establishing and managing an organizations' digital strategy.

For example, one Fortune 500 company built frameworks to drive a higher degree of strategic certainty, based on algorithmic decisions, by classifying their Voice of Customer data from key stakeholders and participants across their ecosystem. This allowed them to establish a shared perspective and basis for dialogue regarding the strategic imperatives influencing the relevancy and alignment of their analysis projects with the priorities of the business.

With a mosaic of disparate systems, workgroups, and data sources, these frameworks deliver an essential capability by satisfying the critical need for agile governance to organize, integrate, attribute, and normalize data from internal and external sources, including the processes, transactions, sensors, social and mobile data used in analysis and data mining.

Process Models

Data Scientists utilize multiple standards to ensure a scientific approach to empirical study is followed for each project, one that is suitable to its strategic purpose. Platforms allow analysts to leverage the same low-code tools now familiar to those Citizens serving in a BPM role to rapidly build a "process around the process" of gathering, validating, interpreting, and utilizing data and resources to effectively manage the variables unique to each specific project.

These process models instantiate the best practices and protocols of collecting, staging, and capitalizing on multi-dimensional data sets to measure, manage, and monetize information. They establish a clear path for Citizen Teams to consistently and accurately perform data wrangling chores. The more advanced platforms also provide the ability to add context-specific knowledge assets to a particular step in any process to further inform and guide team members. This keeps the development and "education" of analytics on track.

Equally vital to the efforts of Data Science, are platform features that allow you to build in the critical "analysis of analysis" through Quantitative Scoring to ensure the validity and veracity of data based on hard facts.

Visualization

Over 99.5% of all data captured globally has yet to be explored. Therein lies the opportunity.

Visualization is essential for exploring big data: exposing patterns and unseen relationships between variables to discover valuable insights for your business.

Most low-code platforms typically allow developers to design user-specific dashboards based on defined metrics and historical findings to improve performance of their business process models, particularly those controlling the Customer experience.

Players in this space offer advanced visual data discovery solutions that render graphic depictions of ad hoc queries and complex datasets with multi-dimensional attributes generated from data and metadata. These interactive views dynamically change based on any combination of the dimensions selected, empowering analysts to quickly drill down into the data, isolate variables, and discover meaningful insights that fuel competitive advantage. Since a picture is worth a thousand words, we invite you to view one such visualization tool in action in the Arrayworks video found at www.arrayworks.com/visualization.

Platform Strategies

While we've highlighted a few of the key advantages of the advancements in technology, digital platform strategies encompass the business, operational, IT and analytic imperatives for the management, collaboration, and enablement of innovation by decision-makers throughout your business, to continually improve Customer experience, User experience and the bottom line.

Platforms offer transparency and real-time insights into relationships and interactions among ecosystem participants to foster awareness. They define a framework of agile governance to align leaderships' strategic and operational investments with these participants' contributions to optimize the iterative process of managing an evolving and increasingly complex digital business architecture. Most importantly, platforms enable the automation of actionable insights derived from these efforts and seamlessly link them to corresponding market responses and accountability programs to track outcomes and promote an unceasing cycle of growth in business value.

Conclusion

The global acceleration of innovation and the velocity of change across all industries is already having a major impact on business as technology continues to re-define the way we live, work, and interact with the world around us. The convergence of the Internet of Things, Big Data, Infonomics and Algorithmic Business in the 4th Industrial Revolution requires organizations to retool their core capabilities to drive future business value.

Organizations that are successfully meeting the broad reaching challenges in this era of disruption are focused on combining talent and platform strategies that increase their ability to "digitally" collaborate with ecosystem partners; and empower data-driven teams to exploit the collective functions and information that form the basis of engaging Customer experiences.

While the entire world is learning to navigate this new frontier, Citizen Data Scientists represent an emergent class of process excellence professionals that can be developed through a proven program of educational advancement to rapidly expand an organization's capacity to monetize their insights. Armed with advanced low-code application development platforms that integrate business process management with analytic insights and algorithmic decision-making, organizations can bridge the critical gap between knowledge, insights, and action and complete the circle of continuous enhancement automation necessary to achieve digital advantage in a data-driven economy.

About Arrayworks

Arrayworks was founded in 2000 to fulfill a simple yet breakthrough promise: technology should empower enterprises to achieve their most audacious goals.

Our platform's unique data-driven model lets you bring your business processes to life, adapt them on the fly, and tie everything together on a single platform. Built from the ground up to manage today's velocity, veracity and variety of data, you'll be creating flexible apps tailored to the exact needs of your business. By uniting knowledge, resources and existing systems, you can guide every employee to greater achievements, deliver superior customer experiences, and lead your business to extraordinary outcomes.

Contact us to learn more about working together.

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This white paper was developed in collaboration with Ambient Intelligence, Inc. http//ambientintelligence.co

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