Preparing for the Data Science-Driven Era

Cisco IT Insights

What

According to research conducted by the McKinsey Global Institute, by 2018 the U.S. will experience a shortage of 190,000 skilled data scientists, and 1.5 million managers and analysts will be unequipped to garner actionable insights from Big Data analytics. The future shortage of data scientists presents a unique opportunity for companies currently investing in and building their analytic capabilities. Annika Jimenez, global head of data science services at Pivotal, states, “It is no longer enough to be a data-driven enterprise. Instead you must build a data science-driven enterprise.”

As the Internet of Everything (IoE) brings people, processes, data, and things together via networked connections, and digitization multiplies stored corporate data by orders of magnitude, analytic capabilities will be a major factor in determining which companies blossom during this new era and which companies fade into irrelevancy. Big Data analytics will be the gateway for organizations to turn masses of digitized information collected from connecting the unconnected into actions that create new capabilities, richer experiences, and unprecedented economic opportunity.

Cisco recognizes the importance of preparing for the data-driven era and has begun to strategically align current and future goals so that we are prepared to stake our claim in the estimated US$19 trillion dollar opportunity that is the Internet of Things. Over the past two years, we have made great strides in understanding the value surrounding Big Data analytics. We are preparing for the future of analytics by creating internal data science education programs, developing university partnerships to help train future talent, constructing state-of-the-art data visualization labs, and applying analytics to our own products.

Why

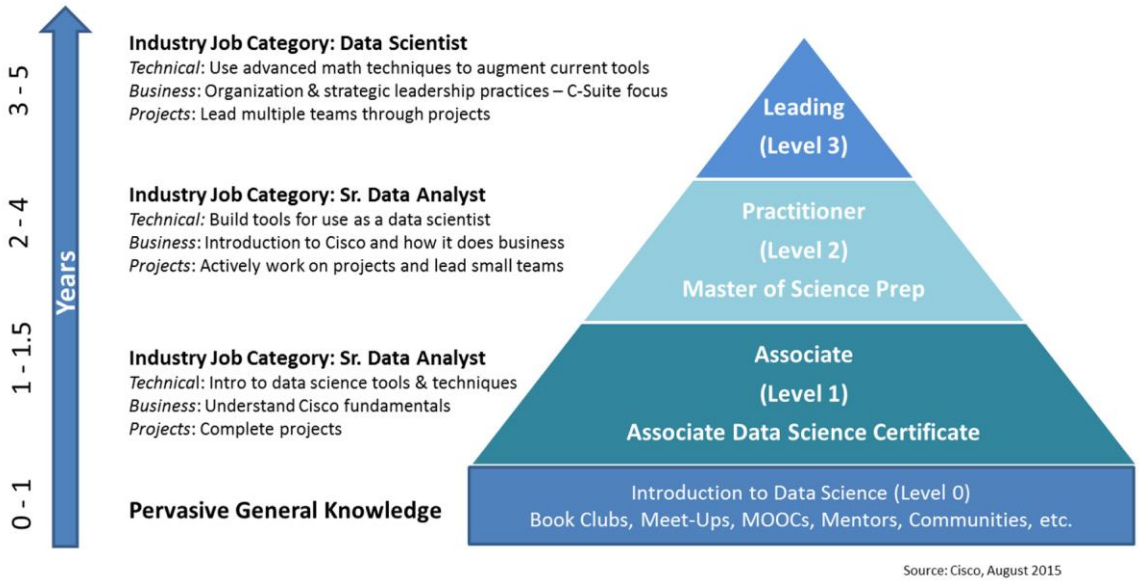
In a 2013 study conducted by Bain & Company, more than 400 executives at companies averaging more than 1 billion dollars in annual revenue were asked about their analytic effectiveness. The study concluded that only 4 percent (16 out of 400) of the executives surveyed were actually good at analytics. The 16 executives considered “good” or “effective” met Bain & Company’s three-step analytic competency checklist. To be considered effective at analytics, a leader must:

- Set the ambition
- Invest in and build analytic capabilities
- Organize the company to make the most of its analytic opportunities.

Cisco senior leadership cohesively supports a culture that uses data and analytics to aid in decision making. Instead of poaching top-tier industry talent to fill analytics gaps, we have created an internal education program that teaches employees data science fundamentals. Partnering with the University of Washington and North Carolina State University, hundreds of Cisco employees are participating in a seven-month data science course taught by renowned statisticians, computer scientists, and mathematicians. The goal of the data science program is to create a pervasive level of analytical knowledge within every organization company wide.

To quantify personnel readiness and fulfill the need for varying levels of analytic talent, Cisco IT created the Pyramid of Analytic Knowledge (see Figure 1). The base of the pyramid, or Level 0, is considered pervasive general knowledge: all employees will have a basic understanding of analytics as a discipline. Managers strategically choose which employees will continue their training or follow a more analytic-focused career path. Employees who continue their training are tapped as “a center of excellence” within their specific function. They lead their organization’s analytic initiatives.

Figure 1. Pyramid of Analytic Knowledge



In addition to investing in developing the analytic capabilities of existing employees, Cisco engages with more than eight universities to help create a pipeline of future workers highly skilled in analytics. An effective way to do this is by engaging students early in their academic careers. We sponsor data science-focused projects that hundreds of university students work on.

Aleks Frelas, a senior Computer Information Systems major at Purdue University, participated in a data science project that analyzed sentiment toward Cisco using tweets. According to Frelas, this experience “gave [him] confidence that data mining and data warehousing are the types of work [he] wants to do in the future.”

The Cisco Data Visualization Lab

Cisco has developed a unique environment to encourage analytical problem solving. It’s called the data visualization lab. These physical environments encourage discussion, streamline cross-functional collaboration, offer an all-inclusive technical platform that aids complex analytic research, and, overall, assist in helping employees discover game-changing opportunities.

Cisco’s flagship data visualization lab is located at our San Jose, California, campus (see Figure 2). The data lab provides:

- A secure, scalable environment for internal and external data streaming or storage
- A managed process for maintaining a dynamic suite of software for data cleansing, analysis, and visualization
- A team of resident data analysts, data visualization experts, and data scientists who join and assist employees in the lab.

Figure 2. Cisco Data Visualization Lab

Every facet of the data lab is conducive to creativity and collaboration. The vibrant orange accent wall and 90 degrees of natural sunlight inspire activity and invigorate the mind. The modular furniture and whiteboard walls encourage spontaneity and teamwork. The large touchscreen and open layout encourage users to stand up, interact, and engage with the data, in contrast to the traditional “I present, you listen” model. The technology in the room, such as the 4K 85 Prysm touchscreen and Cisco’s high-end speaker tracking videoconferencing solution, surpasses the capabilities of traditional conference rooms. The Prysm screen allows:

- Whiteboarding
- Video playback
- Device and document sharing
- On-screen annotations
- Videoconferencing
- Audio recording

Since its opening in February 2015, more than 200 employees have used the data lab for projects ranging from exploratory visualization sessions to executive showcases. For example, Finance IT has used the lab extensively to build, test, and present the group’s financial dashboard, a custom tool (Cisco Financial Analyzer) built on the MicroStrategy platform. This dashboard ties together various real-time data sources with embedded algorithms and decision engines to make better financial decisions. Enhancements to Finance IT’s dashboard have allowed executives, such as our CFO and CIO, to better align their initiatives with Cisco’s current and forecasted financial positions.

Within one month of opening, the flagship data lab hosted more than 60 sessions, all focused on tackling complex business problems. The potential increase in productivity through the reduction in time needed to make decisions is creating a significant return on investment with each data lab that is operationalized, breaking through difficult or previously insoluble business analysis problems.

By the end of 2017, Cisco plans to construct data labs at all its major campuses globally, with the goal of having a dedicated lab for every organization.

Cisco Tool Support

At Cisco, we continue to drive change and spur productivity through the use of our own products and technologies. Not many companies create and deliver products that are as fundamental to their own business productivity as they are fundamental to the well-being of their customers. The application of analytics will play an increasingly large role within Cisco IT. By deploying our products and technologies before releasing them to the public, we can give our data scientists the opportunity to analyze data generated during a product's internal release. Applying analytic techniques at this stage of the product lifecycle helps determine where the data will produce the most value.

Additionally, Cisco IT provides our data scientists uninhibited access to tools and technologies that help them solve the most challenging, complex business problems. These technologies include:

- Collaboration platforms such as Cisco WebEx®, Jabber®, and TelePresence®
- In-house data services such as Cisco's enterprise Hadoop deployment on the Cisco UCS® Common Platform Architecture (CPA) for Big Data
- Our internal private cloud designed for Dev Ops and continuous delivery development
- Cloud native application development tools such as Cisco Data Virtualization, Cisco Integration Platform, and Service Exchange Platform.

Most importantly, our data scientists have access to Cisco's global community of 77,000-plus employees, with a vast breadth and depth of skills and expertise.

Who's Ready?

Rarely in history does an industry such as analytics rise up with the potential to impact not only businesses of all sizes but every aspect of people's lives. Analytics is a hugely powerful set of tools that has been waiting for someone to come and claim it. Cisco leadership understands the significance of analytics and has begun to invest in building our analytic capabilities. Our internal data science education program has the potential to train 500 employees in the analytics discipline within the next two years. Our plan to deploy, on a global scale, highly interactive data visualization labs to assist analytic research, is under way. Helping create a pipeline of future talent skilled in the highly sought after, desperately needed area of analytics has commenced.

The world is an ever changing place. IoE is driving the pace of that change even faster, and opening new opportunities as analytics becomes a more integrated and highly used factor in all of our lives.

For More Information

For a view of early-stage analytics inside Cisco, see the Hadoop Big Data Analytics case study.

To learn how we are using automated scheduling to make analytics easier, see Cisco IT Automates Workloads for Big Data Analytics Environments.

For Cisco Validated Designs for Big Data, see the Design Zone for Big Data.

To read Cisco IT case studies about a variety of business solutions, visit Cisco on Cisco: Inside Cisco IT.

To view Cisco IT webinars and events about related topics, visit Cisco on Cisco Webinars & Events.

Note

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