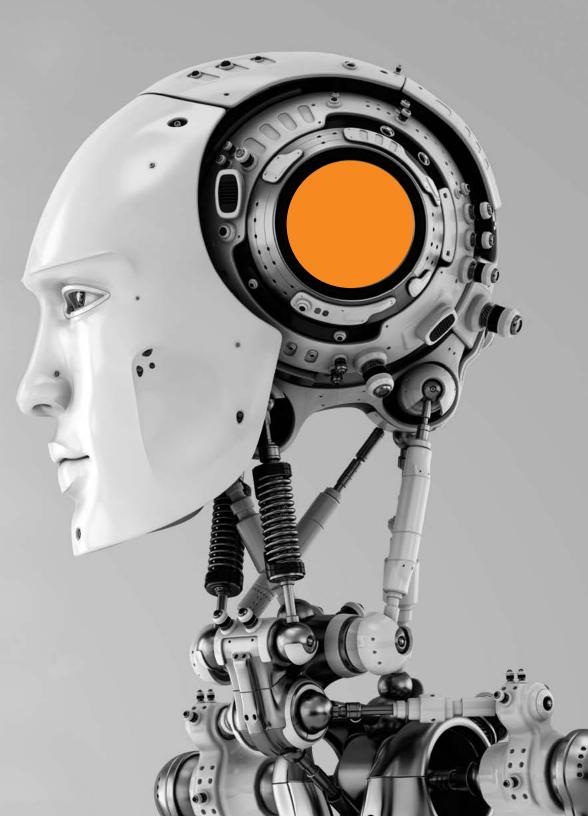
THOMSON REUTERS THE TOP 100 GLOBAL TECHNOLOGY LEADERS



"An organization's ability to learn, and translate that learning into action rapidly, is the ultimate competitive advantage."

-Jack Welch

previous Chairman and CEO of General Electric





LETTER FROM THOMSON REUTERS TECHNOLOGY PRACTICE LEAD DEFINING LEADERSHIP IN THE NEW WORLD ORDER

Ever wonder what it might have been like to live through the Renaissance, to witness first-hand the awakening of the arts, science and education that gave birth to the civilized world? What about the Industrial Revolution, where the world began its massive migration from agricultural to industrialized economies?

Throughout history, there have been dozens of key flash points where conventional wisdom was upended. Look around you: we're living in one right now.

Today, we're watching the gradual evolution from the Knowledge Economy into the Age of Artificial Intelligence and Virtuality. With it, we are also experiencing a fundamental shift in what it means to be a leader in this rapidly-changing marketplace.

Throughout history's evolutionary stages, there have been an elite group of people and companies that have led the change, blazing new frontiers, dismantling the status quo and catapulting the world forward. From early influencers like Copernicus, da Vinci, Kepler and Newton to Descartes, Kant, Franklin and Jefferson, and now to more modern day disrupters such as Gates, Jobs, Musk and Bezos.

With each passing generation, the definition of what it means to be a leader has evolved, as the skills and competencies required have shifted in lockstep with the expansion to a more complex and global operating environment. Leadership, in today's day and age, is judged less in terms of ledgers and balance sheets—as it has been over the last several centuries—and more in terms of the ability to disrupt quickly and establish a vision that captivates the world while staying true to operational rigors and the customer.

Take Amazon, for example, a company that has arguably done more to change the face of commerce than any other business, but has still only posted a handful of profitable quarters in its two-decade history. Amazon CEO Jeff Bezos recently explained the strategy to shareholders saying: "Staying in Day 1 requires you to experiment patiently, accept failures, plant seeds, protect saplings, and double down when you see customer delight."

Contrast that approach with the economic philosophy espoused by Milton Friedman in the 1970s, and adopted by most major businesses over the last 40 years, that being: "The social responsibility of business is to increase its profits." A number of once-great businesses that came of age in the era of profit-above-all-else are now just shadows of what they once were.

Given the massive changes afoot in today's economy, how can we begin to evaluate success? Just as the metrics for achievement in the Enlightenment were different than those of the Renaissance, the ones used to evaluate our current era must also evolve.

That's what we've set out to do with the Thomson Reuters Top 100 Global Tech Leaders program. In collaboration with our Innovation Labs, we've identified the key traits necessary for industry leadership in this new era and we've formulated new metrics for success. We've included components that represent a holistic view of current-day business operations and challenges, such as those related to management and investor confidence, risk, litigation, innovation, people and workforce commitment, sustainability and even news sentiment.

The organizations that fare well across these measures are the companies that have the right mix of big ideas and the wherewithal to achieve them into the future.

Congratulations to the companies that have made the 2018 Thomson Reuters Top 100 Global Technology Leaders list.

You are our future. You are the organizations whose leaders have paved a foundation for longevity, running your tech organization at warp speed while keeping pace with jurisdictional regulations, legal requirements, and the dizzying number of complex business challenges you face.

We salute your fortitude and your vision—here's to the future.

Ladino

Alex Paladino Global Managing Director Technology Practice Group Thomson Reuters

DEFINING INDUSTRY LEADERSHIP

Remember when Netscape Navigator was the dominant web browser and the Pets.com sock puppet was appearing in a seemingly endless stream of TV commercials? It wasn't that long ago, but the world has fundamentally changed since those early days of the tech boom. Many tech giants that have become essential components of everyday life are still just barely two decades old: Amazon, Facebook and Google, to name a few.

As the sector catapults forward, each year brings gamechanging milestones. In 2017 there were four industry megadeals over \$10 billion each in value (Broadcom, KK Pangea, Intel and Vantiv), including the world's largest tech deal ever involving Broadcom's \$115.4 billion bid for rival chipmaker Qualcomm. There were advancements in artificial intelligence, the evolution of bots connecting the Internet to everything, leaps in quantum computing, and the bleeding of technologies into nascent markets. The stock market soared past 24,000 and the average tech valuation of deals reached 27.3 times EBITDA, 12.5-times more than in 2009¹.

THE OTHER SIDE OF EXPLOSIVE GROWTH

But with explosive growth comes mounting challenges. Tech companies that skyrocket into the investor spotlight also confront issues about how to maintain and increase market share, manage globally dispersed supply chains, comply with multi-jurisdictional regulations, and numerous other operational and strategic challenges. Startling stats emerged from a recent Thomson Reuters third party risk survey of technology executives. It showed that 67 percent of respondents only conducted due diligence on their tier one third-party contacts and 66 percent agreed that winning business was a priority for which they might breach regulations.

Beyond third-party risk there are challenges related to data security and privacy, global taxes and trade, regulation and commerce, litigation and finance, and the list goes on.

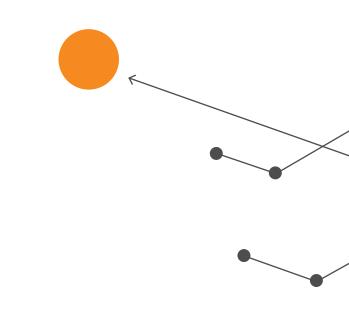
IDENTIFYING INDUSTRY LEADERSHIP

Given the juxtaposition of massive success with these real-time challenges, it's not easy to know which companies are truly poised for longevity, and which are just stepping stones for disruptors who haven't even shown up yet. There are many factors that contribute to the equation for true industry leadership.

To succeed today, tech companies need not only run their day-to-day operations effectively, but they also must manage a confluence of legal, regulatory, operational, environmental, supply chain and technological variables.

To find out which organizations are truly excelling in the tech arena, Thomson Reuters pioneered a unique evaluation framework that incorporates financial performance metrics alongside supply chain risk, pending litigation, innovation, social responsibility and a number of other factors. The resulting list is the Thomson Reuters Top 100 Global Technology Leaders.

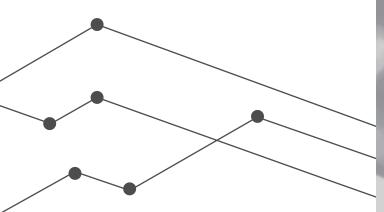
Leveraging its massive trove of data assets and this patent-pending valuation methodology, Thomson Reuters developed a proprietary, objective means of evaluating technology industry leadership in today's complex business environment.



¹ Source: Thomson Reuters Deals Intelligence

"The advance of technology is based on making it fit in so that you don't really even notice it, so it's part of everyday life."

-Bill Gates Co-founder of Microsoft





THE METHODOLOGY BEHIND IDENTIFYING THE TECH LEADERS

To become a Top 100 Global Technology Leader is no small feat.

The data-driven methodology algorithmically calculates organizations at the top of the tech heap via a statistical model employing Bayesian inference. It determines the probabilistic relationship between multiple independent variables and captures those factors that we believe contribute to a company's long-term success potential, providing a score for each company across 28 unique data points representative of the tech sector.

The 28 data points are organized around eight performance pillars, reflecting a holistic view of what's needed for success in today's current business environment. These pillars comprehensively represent a company's impact across many dimensions and on many populations. Included are fundamental financial metrics, such as revenue growth, operating income and earnings estimates, as well as a comprehensive group of risk metrics related to the company's impact on its customers and partners, global suppliers, workforce, society and the environment. It also tracks patent activity as a proxy for technological innovation and sentiment in news and selected social media reflective of the company's reputation in the public sphere.

Thomson Reuters Innovation Lab data scientists use Thomson Reuters Business Classifications, which categorize the world's companies by industry, sector and activity, to select a universe of companies reflective of today's technologies. The set of tech companies is further restricted to those that have at least \$1 billion in annual revenue. All companies with 2016 revenue below \$1 billion are removed from further analysis.

Organizations meeting these criteria are run through the model with variables corresponding to the 28 inputs across the eight pillars. This results in a final score for each company, reflecting its ability to outperform other companies across multiple dimensions. The 100 companies with the highest scores are the Top 100 Global Tech Leaders.

The approach is similar to the scoring used for athletes participating in a decathlon. The rank is based on each organization's overall score, with the top 100 companies having the 100 highest scores in the world. None of the final 100 organizations is necessarily in the top 100 for every particular parameter, but their final scores make them outstanding performers overall. In the same way, it is reasonable to call the top decathletes the "world's greatest athletes" because they perform at a very high level across multiple events requiring different skills, even if their performance in any particular event is not the best in the world. Data visualizations are provided to show each organization's performance across the data points.

Read on to learn more about the eight pillars of performance and their related parameters.



FINANCIAL PERFORMANCE

How is the company performing financially? How profitable is it?

- Asset Worth: Total assets of the company less its total liabilities
- Free Cash Flow/Employee: A measure of financial performance calculated as operating cash flow minus capital expenditures; the cash a company generates after laying out money to maintain or expand its asset base (this number is normalized by the number of employees in the company)
- Leverage: The net debt of the company divided by EBITDA
 - Net debt is a company's total debt less cash and short term investments
 - EBITDA is earnings before interest and taxes for the fiscal year plus the same period's depreciation, supplemental, amortization of acquisition costs, supplemental and amortization of intangibles and supplemental
- **Operating Income Margin**: Represents operating income divided by total revenue
- **3-Year Revenue Growth**: 3-year historical revenue growth percentage
- Return On Invested Capital (ROIC): A financial measure quantifying how well a company generates cash flow relative to the capital it has invested in its business; expressed as a percentage and calculated as ROIC = Net Operating Profit – Adjusted Taxes / Invested Capital

MANAGEMENT & INVESTOR CONFIDENCE

How well run is the company? How much confidence do investors have in it?

- **CAM Sector**: Quantitative equity alpha models that observe market anomalies and human behaviors to provide investment managers with insight in creating market-beating portfolios, distilling volumes of data to a single score for more than 30,000 stocks daily
- **CCR Sector**: The current sector-level percentile rank of a company's one-year default probability distilled down to one final estimate of credit risk at the company level
- Management Score: A company's commitment and effectiveness toward following best practice corporate governance principles
- Shareholders Score: A company's effectiveness toward equal treatment of shareholders and the use of anti-takeover devices



INNOVATION

How innovative is the company? How much is it investing in R&D and does it protect its inventions with patent rights that are successfully granted?

- Average Patent Grants/Year: The number of granted patents that are issued each year
- **Patent Grant/Application Ratio**: The ratio of granted patents to patent applications
- **R&D Spend**: The amount of money a company is spending on research and development (R&D) annually
- Innovation Score: A company's capacity to reduce the environmental costs and burdens for its customers and create new market opportunities through environmental technologies and processes or eco-designed products



LEGAL COMPLIANCE

How litigious is the organization? Does the company live up to its contracts and regulatory obligations?

- Average Litigation/Year: Amount of litigation where the company or subsidiary is a defendant in the areas of employment/labor, intellectual property, commercial law and contracts, civil rights, and unfair competition
- Product Responsibility Score: A company's capacity to produce quality goods and services integrating the customer's health and safety, integrity and data privacy

ENVIRONMENTAL IMPACT

What is the company's ability to reduce environmental impact? What is the external impact on environmental resources?

- Emissions Score: A company's commitment and effectiveness at reducing environmental emission in its production and operational processes
- **Resource Use Score**: A company's performance and capacity to reduce the use of materials, energy or water, and to find more eco-efficient solutions by improving supply chain management



PEOPLE & SOCIAL RESPONSIBILITY

How well does it treat its employees? How socially responsible is it? What is its impact on external people with whom it is contracted?

- **Community Score**:A company's commitment to being a good citizen, protecting public health and respecting business ethics
- CSR Strategy Score: A company's practices to integrate the economic (financial), social and environmental dimensions into its day-to-day decision making
- Human Rights Score: A company's effectiveness toward respecting fundamental human rights conventions
- Workforce Score: A company's effectiveness toward job satisfaction, a healthy and safe workplace, maintaining diversity and equal opportunities, and development opportunities for its workforce



REPUTATION

How well-regarded is the organization by the public? What is the overall news sentiment related to the company?

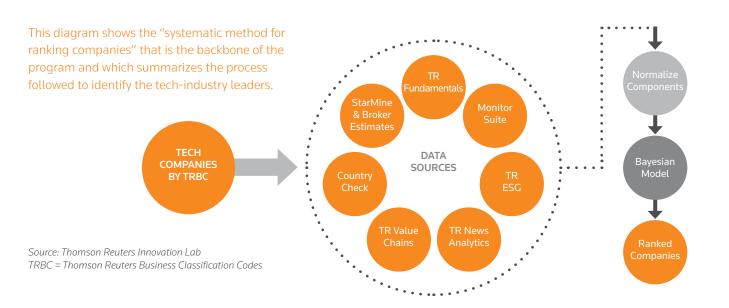
- Overall News Sentiment: The median positive sentiment and negative sentiment values for each company over the last year; the overall sentiment is calculated as the (positiveSentiment) - (negativeSentiment)
- Controversies Score: A company's exposure to environmental, social and governance controversies and negative events reflected in global media



RISK & RESILIENCE

How operationally stable is the company and is it able to withstand shocks and disruptions? How many customers and suppliers does it have? In what countries is it operating?

- Geopolitical Risk: A company's geographical risk exposure as determined by the countries from which the company derives its revenue, and associating each fraction of that revenue with the risk index of that country
- Number of customers: Number of customers of the company
- Number of suppliers: Number of suppliers of the company
- **Supply chain risk**: The risk associated with a company's supply chain, based on the country's risk indices from which the company's suppliers derive their revenue; it attempts to quantify the risk of a company's suppliers and whether they're deriving their revenue from high-risk or low-risk countries



INTRODUCING THE THOMSON REUTERS 2018 TOP 100 GLOBAL TECH LEADERS

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THOMSON REUTERS 2018 TOP 100 TECH LEADERS

Organization	Country/Region
eBay Inc.	United States
Ericsson	Sweden
Facebook	United States
FUJIFILM	Japan
Fujikura Ltd.	Japan
Fujitsu Ltd.	Japan
Gemalto	The Netherlands
HCL Technologies Ltd.	India
Hewlett Packard Enterprise	United States
HP	United States
IBM	United States
Infineon Technologies	Germany
Infosys	India
Intel	United States
Intuit	United States
Lam Research	United States
Leidos	United States
Lenovo	China
LG Electronics	Korea; Republic (S. Korea)
LITE-ON Technology	Taiwan
ManTech International Corporation	United States
Mastercard	United States
Micron Technology	United States
Microsoft	United States
Motorola Solutions	United States
Nanya Technology	Taiwan
National Instruments	United States of America
NCR Corporation	United States of America
NEC	Japan
Nokia	Finland
Nvidia	United States of America
NXP Semiconductors	Netherlands
Oki Electric Industry Co., Ltd.	Japan
ON Semiconductor	United States of America
Oracle	United States of America

Organization	Country/Region
PEGATRON Corporation	Taiwan
Powertech Technology Inc.	Taiwan
Qisda Corporation	Taiwan
Qualcomm	United States of America
Quanta Computer	Taiwan
Renesas Electronics Corporation	Japan
ROHM	Japan
Salesforce	United States of America
Samsung Electronics	Korea; Republic (S. Korea)
SAP	Germany
Seiko Epson Corporation	Japan
Sharp Corporation	Japan
Siliconware Precision Industries Ltd. (SPIL)	Taiwan
SK Hynix Inc.	Korea; Republic (S. Korea)
SONY	Japan
Sopra Steria	France
STMicroelectronic	Switzerland
Symantec Corporation	United States of America
Taiwan Semiconductor Manufacturing Co. Ltd. (TSMC)	Taiwan
Tata Consultancy Services	India
Tech Mahindra	India
Tencent	China
Teradata	United States of America
Texas Instruments	United States of America
Tieto	Finland
Tokyo Electron	Japan
Total System Services (TSYS)	United States of America
Unisys	United States of America
United Microelectronics Corporation	Taiwan
Vmware	United States of America
Wipro	India
Wistron Corporation	Taiwan
Workday, Inc.	United States of America
Xerox Corporation	United States of America
ZTE Corporation	China



TOP 100 GEOGRAPHY & OUTPERFORMANCE METRICS

The United States is by far the most prolific headquarter country for the top 100 technology leaders. Forty-five percent of these tech companies hail from this nation, including many of the likely suspects, such as Alphabet, Amazon, Facebook and Microsoft, as well as a number of others that have recently risen to technology prominence including HPE (Hewlett Packard Enterprise), Nvidia and Symantec.

Japan and Taiwan are tied for the next two most active countries with 13 top 100 global tech companies each, as shown in Figure 1. They're followed by India, with five leaders, and then a group of countries with anywhere from three to one tech toppers in their midst.

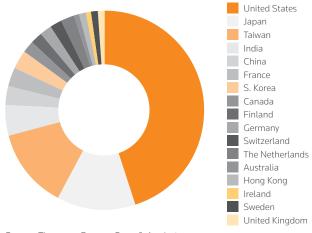
CONTINENTAL DIVIDE

When looking at technology leaders by continent, North America leads with 47, followed by Asia with 38, Europe with 14 and one from Australia, as shown in Figure 2. It may not come as much of a surprise that the U.S. is home to so many tech companies, with its notorious Silicon Valley in California. Canada is also growing its tech reputation, as evidenced by the addition of Celestica and CGI, in the semiconductor and software services spaces, respectively.

It is equally interesting to see the rise of tech dominance in Asia. The Wall Street Journal recently wrote a piece about the growth of Asia's tech giants, highlighting companies such as Tencent, Samsung and Taiwan Semiconductor Manufacturing. At the time, Tencent had just reported a 61 percent increase in quarterly revenue over the prior year.

China (3), Hong Kong (1), India (5), Japan (13), S. Korea (3), and Taiwan (13) contribute 38 percent of the companies in the top 100 tech leaders. While there is fair representation across the subsectors within technology across these Asian nations, India's presence is dominated by Software and IT Services companies while Hong Kongs', South Koreas' and Taiwans' leaders all fall within two subsector areas: those related to semiconductors, computers, phones and household tech. China and Japan, on the other hand, have more dispersed representation based on the type of technology companies that made the top 100 list.

Figure 1: Top 100 Global Tech Leaders by Headquarter Country



Source: Thomson Reuters Data & Analysis

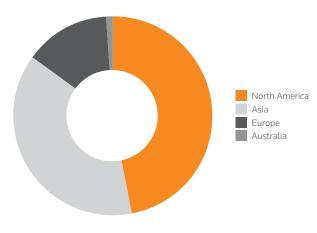


Figure 2: Top 100 Global Tech Leaders by Continent

Source: Thomson Reuters Data & Analysis

ABSENTEES

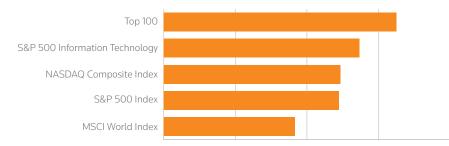
Absent from the top 100 tech leaders list are companies from Africa, Antarctica, Eurasia and South America. These regions are still emerging in terms of their tech leadership. While there are certainly companies that play an important role in the global technology landscape emanating from them, they are yet to make the top 100 list as they are still striving for the balance of achieving financial success while also ensuring their organizations are at the top of the group in terms of operational fortitude.

OUTPERFORMANCE

The Dow Jones Industrial Average rang in the new year by blasting past 25,000 in early 2018. A previously unimaginable milestone became a reality. The market's steady climb over the last several years, including a 7,000-point bump in just the last 15 months, is defying odds and giving analysts plenty to ponder. There's no denying that the market is on a tear and tech stocks such as Apple, among many others, have contributed to its growth.

The Thomson Reuters Top 100 Global Technology Leaders' stock price jumped by 16.27 percent from 2015 to 2016. This compares to the other indices and their same-period changes as follows: the S&P 500 Information Technology Index increased 13.68 percent; the Nasdaq Composite Index rose 12.36 percent; the S&P 500 Index grew 12.23 percent; and, the MSCI World Index jumped 9.17 percent, as shown in Figure 3. This translates into outperformance deltas of 2.58 percent, 3.91 percent, 4.04 percent and 7.10 percent, respectively.

Figure 3: Year-over-Year Stock Price Percent Change (2016 v 2015)



Source: Thomson Reuters Data & Analysis



REVENUE PERCENT CHANGE

The Top 100 experienced an 11.37 percent revenue change from 2015 to 2016. This is 5.0 percent better than the S&P 500 Index and 2.67 percent better than the MSCI World Index, which grew by 6.37 percent and 8.7 percent, respectively, as shown in Figure 4.

EMPLOYEE PERCENT CHANGE

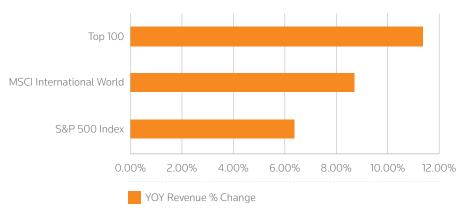
The Top 100 Global Tech Leaders also outperformed major indices in year-over-year employee (staffing) percent change, except for the Nasdaq Index. These 100 companies had a 9.82 percent increase in their employee base, as compared to the S&P 500 Information Tech Index with a 9.7 percent bump, the S&P 500 Index with a 6.07 percent increase and the MSCI World Index with a 5.10 percent jump, as shown in Figure 5. The percent differences are .12 percent, 3.76 percent and 4.72 percent, respectively.

R&D INVESTMENT PERCENT CHANGE

Another area in which the Top 100 Tech Leaders outperform other indices is that of R&D investment. The amount a company spends on R&D is an indicator of its financial status and eye toward growth. Typically, higher R&D investments are a sign of corporate health and longevity.

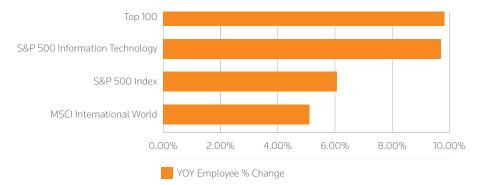
The Top 100 increased its year-over-year R&D investment by 13.09 percent. This compares to the S&P 500 Information Tech Index which rose by 12.34 percent; the Nasdaq Index which grew by 12.22 percent and the S&P 500 which had a 3.88 percent lift, as shown in Figure 6. The percent differences are .75 percent, .87 percent and 9.21 percent, respectively.

Figure 4: Year-over-Year Revenue Percentage Change (2016 v. 2015)



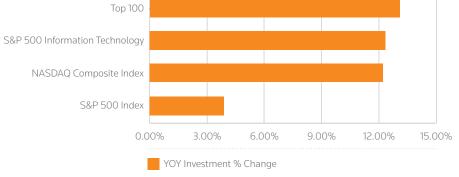
Source: Thomson Reuters Data & Analysis

Figure 5: Year-over-Year Employee Percent Change (2016 v. 2015)



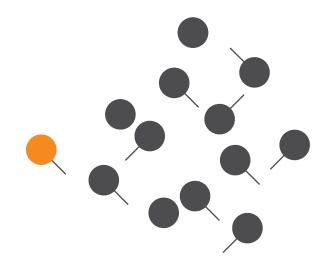
Source: Thomson Reuters Data & Analysis





Source: Thomson Reuters Data & Analysis

The outperformance metrics of the top 100 add another layer of credibility to the program's methodology. They demonstrate that a holistic view of an organization is essential to identifying true industry leadership, underscoring the importance of factors such as supply-chain risk, outstanding litigation, management and investor confidence, people and social responsibility, innovation and reputation.





A CONDUIT TO TECHNOLOGY LEADERSHIP

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Alex Paladino Managing Director, Tech Practice



Asif Alam Global Business Director, Tech Practice



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Jill Warner

Tech Practice



Patrick Fisher Global Business Director, Tech Practice

Global Business Director,

THE INNOVATION LAB TEAM

Members of the Thomson Reuters Boston Innovation Lab, in conjunction with the Technology Practice Group, worked to develop the objective methodology used to assess tech-industry leadership.



Omar Bari Data Scientist



Alex Constandache Senior Data Scientist



Brian Romer Data Visualization Lead

Learn more about the Innovation Labs at Thomson Reuters: innovation.thomsonreuters.com/en/labs



Amit Shavit Data Scientist



Brian Ulicny Senior Director

"Through this project, the Lab was able to leverage cutting-edge probabilistic programming techniques to implement a Bayesian model of how technology company leadership manifests across the various performance metrics.
Despite nuances in the data, we were able to model performance excellence as dominance in multiple domains similar to how decathlon competitions identify the world's best athletes."

-Brian Ulicny Senior director of Thomson Reuters Labs



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