



Accounting for a
Sustainable Future™

SOFTWARE & IT SERVICES

Research Brief

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SOFTWARE & IT SERVICES

Research Brief

SASB's Industry Brief provides evidence for the material sustainability issues in the industry. The brief opens with a summary of the industry, including relevant legislative and regulatory trends and sustainability risks and opportunities. Following this, evidence for each material sustainability issue (in the categories of Environment, Social Capital, Human Capital, Business Model and Innovation, and Leadership and Governance) is presented. SASB's Industry Brief can be used to understand the data underlying SASB Sustainability Accounting Standards. For accounting metrics and disclosure guidance, please see SASB's Sustainability Accounting Standards. For information about the legal basis for SASB and SASB's standards development process, please see the Conceptual Framework.

SASB identifies the minimum set of sustainability issues likely to be material for companies within a given industry. However, the final determination of materiality is the onus of the company.

Related Documents

- [Technology & Communication Sustainability Accounting Standards](#)
- [Industry Working Group Participants](#)
- [SASB Conceptual Framework](#)
- [Example of Integrated Disclosure in Form 10-K](#)

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MATERIAL SUSTAINABILITY ISSUES

Environment

- Environmental Footprint of Hardware Infrastructure

Social Capital

- Data Privacy & Freedom of Expression
- Data Security

Human Capital

- Recruiting & Managing a Global, Diverse Skilled Workforce

Leadership and Governance

- Managing Systemic Risks from Technology Disruptions
- Intellectual Property Protection & Competitive Behavior

hardware systems together provide enhanced efficiencies in business operations and have the potential to enable industries and consumers to lower their environmental impacts and expand social benefits. Software & IT Services companies can help customers address resource challenges by, for example, automating energy management or diminishing the need for in-house data centers. New business models across the sector are creating inherent opportunities to close the 'digital divide' that previously inhibited access to technology and information for the underprivileged, disabled, or elderly.

However, with rapid expansion of software, IT services, and digitalization of lives and economies come growing social and environmental externalities that companies in the industry must address in order to protect and enhance shareholder value. Management (or mismanagement) of material sustainability issues has the potential to affect their valuation through impacts on profits, assets, liabilities, and cost of capital.

Software & IT Services companies reporting in their regulatory filings metrics on the material sustainability risks and opportunities that could affect value in the near- and long-term, would provide investors with a more holistic and comparable view of performance. This would include both positive and negative externalities, and the non-financial forms of capital that the industry relies on for value creation.

Specifically, performance on the following sustainability issues will drive competitiveness within the Software & IT Services industry:

INTRODUCTION

Modern economies are dependent on the use of technology and information services for growth; the Technology and Communications sector plays a vital role in developing economically important products, enabling companies and consumers to communicate and process information rapidly and with great efficiency.

Driven by continuous innovation, software and

- Managing energy and water consumption, particularly for companies with large or growing data center operations;
- Ensuring the privacy of customer data for both retail and corporate customers, and managing government relations or business strategy on issues related to data privacy and freedom of expression;
- Managing the increasing risk of cyber-attacks, particularly for cloud-based services;
- Managing intellectual and human capital in an environment of expanding global operations and limited availability of workers trained in Science, Technology, Engineering, and Mathematics (STEM) disciplines, while ensuring workforce diversity;
- Managing risks to business operations that could potentially create systemic or social disruption, particularly as the industry moves towards a cloud-computing model; and
- Balancing the need to protect intellectual property (IP) that incentivizes innovation with the need to ensure competitive business practices

INDUSTRY SUMMARY

The Software & Information Technology (IT) Services industry comprises companies that develop and sell application and system software, delivered through cloud-based and physical

platforms. This includes general applications software for personal and enterprise computers and mobile devices, and specific software such as for engineering design, digital media, and healthcare. Some companies in the industry develop infrastructure software and middleware, including operating systems, database management systems, anti-virus and recovery systems, software embedded in electronic equipment, and web and application servers. IT Services companies deliver specialized IT functions, including consulting and outsourced data processing services.¹

Global revenues in the Software segment of the industry were about \$400 billion, and in IT Services approximately \$640 billion, according to the latest annual data.¹ The Software & IT Services industry serves retail, business and government customers globally, with the latter two accounting for over 82 percent and eight percent of U.S. industry revenues, respectively.² For business and government customers, the industry adds value by supporting key operations, such as supply chain management and product design. For retail consumers, companies provide entertainment and leisure services, in addition to communication and information offerings.

The industry is characterized by constant and rapid technological progress; as such, market leaders may quickly lose market share from the introduction of disruptive technology if they are unable to innovate and capitalize on emerging trends.³ Customer loyalty is important for generating sustained revenues that can

¹ A list of representative companies appears in Appendix I.

help support Research and Development (R&D) activity.⁴ Given the high percentage of business customers, corporate profits and business confidence impact investments in IT, and therefore revenues in the industry. The use of outsourced IT support by business customers and the level of merger and acquisition (M&A) activity in the economy influence demand for IT Services in particular.⁵ Household disposable income and penetration of computers and mobile devices also drive overall industry demand.⁶ Growth in new licenses, subscription fees and ongoing “maintenance” revenues are important metrics for a company’s relative competitive position.⁷

Employee compensation is a significant cost for the industry and can be the largest cost component, depending on a company’s main activities. Software development is being outsourced and offshored from the U.S. to countries that serve both as sources of lower cost skilled labor and also as markets for industry sales, which can be a source of regulatory or public pressure for companies.⁸

Other major sources of costs include intellectual property (IP), marketing and purchases. For the Software segment, a major proportion of the costs relates to the development, marketing or technical support for new software rather than the incremental costs of software reproduction or updates. Companies frequently introduce product updates, while often charging full price for successive versions. This contributes to the fact that the Software segment has one of the widest profit margins in the U.S. economy;⁹ for example, profit margins can be as high as 36 percent for companies operating in the business enterprise software space.¹⁰

Together with acquisition of highly-skilled employees, IP protection drives competitive strength in the industry. Although firms often license their IP to others, they are commonly involved in legal disputes or out-of-court settlements over patent protection or infringement.¹¹ There is a high degree of M&A activity among industry players to acquire IP, facilitate new product development, increase market share or improve their ability to source lower cost inputs. Some high profile examples include acquisitions by Microsoft of Skype and Oracle of PeopleSoft, respectively. Companies also focus on effective marketing and building their brand to improve their market share.¹²

The industry is generally competitive, but with dominant players in some segments. There are many small players providing specialized products and services, particularly for applications software and IT services. Companies selling operating systems or other infrastructure software often have a dominant position due to “network effects,” whereby wide adoption of such software leads to self-perpetuating growth in its sales. This is due to other products and services being developed to be compatible with the standard software that has the largest number of users, and customers choosing infrastructure software with the largest number of compatible applications, enjoying the benefits of economies of scale, common training and administration.¹³

Key disruptive trends within the Technology and Communications sector that are creating new risks and opportunities for the Software & IT Services industry include:

- **Cloud-computing, Virtualization and Software as a Service (SaaS):** Cloud-computing¹¹ is enabling software to be delivered as a service over the Internet, rather than a product that has to be installed on individual devices using compact discs (CDs).¹⁴ Global enterprise spending on public cloud services was estimated to be around \$109 billion in 2012 and is expected to reach \$207 billion by 2016. Furthermore, over 90 percent of all connected consumer devices are expected to have integrated cloud services such as Dropbox, and Apple's iCloud by the end of 2013.¹⁵ This is lowering costs and enhancing computing capability for end-users, while making distribution of software more efficient and stabilizing cash flows for software companies through regular subscription payments. However, companies may incur additional costs to maintain significant hardware infrastructure such as data centers.
- **Big Data analytics and machine-to-machine (M-to-M) communication:** Growing numbers of devices are being embedded with hardware and software capabilities and getting interconnected, which enables data flow and analysis across an enterprise infrastructure. Players in the Software & IT Services industry are looking to capitalize on the potential for an "internet of things," with around 1.1 billion embedded intelligent systems already in the market. "Big Data" can be used to improve operational efficiencies or provide new products and services.¹⁶
- **Growth in mobile device usage:** According to IDC, smartphone spending is expected to have a five-year Compound Annual Growth Rate (CAGR) of 18.4 percent and tablet spending of 30 percent through 2015,¹⁷ expanding opportunities for software service delivery.
- Other key trends include use of **open-source software (OSS)**, including by cloud-computing operators, and the **online, often-free, delivery of software** for consumers, such as Google Drive, sometimes provided by companies in the Internet Media & Services industry.¹⁸

These trends are leading to high-value IT services and new software capabilities and uses, for example, software for automotive communication systems. As companies in the industry begin to operate across a growing range of platforms and markets, such as mobile devices and cloud-computing, they are increasingly competing with players in other industries, such as Internet Media & Services, and Hardware.

LEGISLATIVE AND REGULATORY TRENDS IN THE SOFTWARE & IT SERVICES INDUSTRY

The Software & IT Services industry is lightly regulated; however, as data security and pri-

¹¹ Cloud computing enables computing tasks and storage to be carried out on remote servers in data centers owned by the cloud computing service provider, rather than on individual computers or mobile devices, which may be limited by their hardware and system capabilities.

privacy concerns rise with the increasing storage and use of customer data, particularly on the Cloud, the industry is facing more regulations related to data protection and cybersecurity, with a potential impact on shareholder value. In addition, the industry is highly impacted by IP laws and exposed to anti-competitive practices related to network effects. The following section provides a brief summary of key regulations and legislative efforts related to this industry.¹⁸

There is increasing regulatory interest in data use and protection, particularly related to mobile application software (“mobile apps”), protection of children’s data and privacy, and cybersecurity. In the U.S., the Federal Trade Commission (FTC), which works on consumer protection, is investigating privacy violations related to mobile apps, and legislation such as the Apps Act is being planned that would require software developers and programmers to strengthen disclosure and data protection. The FTC’s mobile technology unit issued a report in February 2013, which recommends that companies like Apple, Google and Microsoft, among others, set greater privacy requirements for developers using their systems.¹⁹ In December 2012, the FTC revised its Children’s Online Privacy Protection Rule to keep pace with changing technology and ways in which children use and access the Internet, including the use of mobile devices and social networking. The amended Rule seeks to increase FTC oversight of the “safe harbor” provision, which

allows industry groups to seek FTC approval of self-regulatory guidelines.²⁰

The European Commission has proposed new data privacy regulations to replace its existing Data Protection Directive, which will bring U.S.-based technology companies without access to or ownership of physical operations in the European Union (E.U.) under its purview for the first time if such companies offer goods or services to, or monitor data of, E.U. citizens.²¹ Under the revised rules, the E.U. is introducing more stringent and harmonized rules regarding fines imposed on companies.²²

A working group comprising national data protection authorities of E.U. Member States (Article 29 Working Party) recently adopted an opinion addressing data protection risks of mobile apps. The group highlighted that, on average, a smartphone user downloads 37 apps, which collect large quantities of personal information about the user, including location and contact details, banking information, photos, etc. According to the group’s Chairman, “This often happens without the free and informed consent of users, resulting in a breach of European data protection law.” The group notes that poor security also creates data protection risks, and could result in unauthorized processing of personal data, including for market research. The opinion by the Article 29 Working Party places specific obligations on app developers and all other parties involved in the development and distribution of apps,²³

¹⁸This section does not purport to contain a comprehensive review of all regulations related to this industry, but is intended to highlight some ways in which regulatory trends are impacting the industry.

and national authorities have the power to take action against companies, including levying fines.²⁴

In addition to data privacy regulations, companies are likely to be subject to emerging cybersecurity laws. Forty-six U.S. states, the District of Columbia, Puerto Rico, the U.S. Virgin Islands, and Guam have enacted legislation requiring companies to notify their customers when security breaches of personal information occur.²⁵ President Obama signed an Executive Order in February 2013 and issued a Presidential Policy Directive 21, which direct the National Institute of Standards and Technology (NIST) to develop cybersecurity standards for critical national infrastructure and expand information sharing between government agencies and the private sector on cyber threats and malicious activity.²⁶ The NIST released its Preliminary Cybersecurity Framework in October, 2013, and planned to publish the official framework in February 2014.²⁷ Although the order currently excludes private firms offering commercial and consumer products and services, experts believe that this could eventually include cloud-based services, affecting the Software & IT Services industry.²⁸

Other legislative actions on cybersecurity, bolstered by U.S. intelligence officials' warnings about the threat of electronic attacks, include attempts to enact the Cyber Intelligence Sharing and Protection Act (CISPA), to provide immunity to companies from lawsuits when they share information voluntarily with each other and the government. CISPA was recently

passed by the House of Representatives, but it faces opposition from the White House and activist groups due to concerns about inadequate privacy protections.²⁹ Companies must strike a difficult balance between protection of customer privacy and requirements to share customer information with governments in the U.S. and other countries. In January 2014, the U.S. Department of Justice agreed to relax standards over company disclosures of government data requests. The decision came in response to changes to the government data collection policy in the wake of the 2013 exposure of government surveillance programs conducted by the National Security Agency (NSA) since 2007. Companies including Google, Microsoft, and Yahoo! applauded the decision; technology firms are concerned that customer uncertainty over the degree of government surveillance and tampering could reduce sales of software products and services. Companies may still only report the number of government data requests in broad ranges and after a six-month waiting period.³⁰ In February 2014, several companies including Microsoft released government request information and the number of customer accounts that the requests had affected.³¹

Besides emerging data protection and cybersecurity laws, the two main types of regulations governing this industry are those related to anti-trust and IP protection, in the U.S. and other markets. The U.S. Congress has passed several acts related to unfair competition, not necessarily specific to the Software & IT Services industry, but nevertheless affecting it.³²

Given that network effects in the industry have the potential to create a monopoly position for some major players that might affect pricing, quality, or access to competing products and services for customers, anti-trust laws pose risks to such industry firms. Furthermore, the industry relies on strong legal protection of IP, including brands, patents and copyrights. The U.S. is a signatory to a number of international treaties related to IP protection, and federal copyright laws such as the Digital Millennium Copyright Act of 1998 protect owners of copyrighted material from unauthorized use of the material. In addition, the industry will be affected by the Leahy-Smith America Invents Act of 2011, which moves patent protection from a “first to invent” to a “first to file” system.³³

SUSTAINABILITY-RELATED RISKS & OPPORTUNITIES

Industry drivers and recent regulations suggest that while traditional value drivers will continue to impact financial performance, intangible assets such as environmental, social and human capitals, company leadership and governance, and the company's ability to innovate to address environmental and social issues are likely to contribute increasingly to financial and business value.

Broad industry trends are driving the importance of sustainability performance in the Software & IT Services industry:

- **Growing data:** Industry trends like cloud-computing and Big Data analytics are leading to concerns about the security and privacy of data to which Software & IT Services companies have access.
- **Expanding IT hardware infrastructure:** As the need for hardware storage and processing infrastructure moves from enterprises and customers to Software & IT Services companies, environmental impacts of hardware energy and water consumption get concentrated in these firms.
- **Digital interconnectedness of the economy:** With enterprises, governments, and individual consumers increasingly depending on Software & IT Services providers for their data storage and processing needs, robustness of cloud-based services and IT infrastructure becomes important to avoid systemic or economy-wide disruptions.
- **Network effects:** Inherent network effects in the industry pose anti-trust risks, as discussed above.
- **Diversity as an engine of innovation:** The contribution of a diverse workforce to innovation and customer empathy is increasingly being recognized, even as the industry faces challenges in improving the proportion of women and minorities in the workforce, and recruiting workers from STEM disciplines.

As described above, the regulatory and legislative environment surrounding the Software & IT Services industry emphasizes the importance of

sustainability management and performance. Specifically, recent trends suggest a regulatory emphasis on customer protection, which will serve to align the interests of society with those of investors.

The following section provides a brief description of each sustainability issue that is likely to have material implications for the Software & IT Services industry. Included in the description is evidence of materiality as well as an explanation of how the issue could impact valuation. A table indicating the nature of the value impact and evidence of interest from stakeholders appears in Appendix IIA. Appendix IIB expands on the channels of financial impacts of each sustainability issue and the recommended disclosure framework appears in Appendix III.

ENVIRONMENT

The environmental dimension of sustainability includes corporate impact on the environment, either through the use of non-renewable natural resources as input to the factors of production (e.g., water, minerals, ecosystems, and biodiversity) or through environmental externalities or other harmful releases to the environment, such as air and water pollution, waste disposal, and greenhouse gas (GHG) emissions.

The Software & IT Services industry typically does not utilize significant natural resources

in its operations directly; therefore, its direct environmental impact tends to be limited both in aggregate and in comparison to other industries. However, with the industry moving increasingly to a cloud-computing model, energy and water management in data centers and other hardware owned or operated by Software & IT Services companies is becoming increasingly material. Energy consumption translates into companies' indirect contribution to GHG emissions. This has potential implications for costs (as pricing of GHG emissions could be passed on to companies purchasing carbon-intensive electricity), reputation and attractiveness to customers in the medium- to long-term (as public concern in other industries drive a closer inspection of the environmental impacts of supply chains by customers). Furthermore, access to reliable, cheap supplies of water for cooling computing centers is increasingly a focus during planning and operating such facilities.

Environmental Footprint of Hardware Infrastructure

A large part of the energy consumed by the industry is used to power critical hardware and IT infrastructure in data centers and software development labs.^{IV} Data centers need to be powered continuously; disruptions to energy supply can have a material impact on operations, depending on the magnitude and timing

^{IV}Leading publicly-listed companies in the industry, accounting for a significant proportion of industry revenues, own several large data centers and software development labs globally. Smaller Software & IT Services companies may primarily utilize cloud-services by other providers for their data storage and processing needs. Their direct environmental footprint therefore may not be significant.

of the disruption. Companies also face a trade-off between energy and water consumption for their data center cooling needs. Cooling data centers with water instead of chillers is a means of improving energy efficiency but can lead to dependence on significant local water resources.

Managing the environmental footprint of the significant hardware infrastructure used in this industry is important for managing costs, obtaining reliable supplies of energy and water, and lowering reputational risks. With increasing global focus on climate change, regulatory and customer actions place greater emphasis on resource conservation, and innovations in energy efficiency and renewable energy provide new avenues for energy management. Furthermore, water is becoming a scarce resource around the world, due to increasing consumption from population growth and rapid urbanization, and reduced supplies due to climate change. Many important river basins can already be considered “stressed”.³⁴ Water scarcity can result in higher supply costs, supply disruptions, and social tensions, which companies with large water needs for cooling data centers may need to contend with.

Software & IT Services companies can pursue various strategies to achieve energy efficiency, including purchasing more efficient hardware, optimizing data center locations, managing energy “hotspots” in data centers, cooling with outside air rather than using chillers or water, and implementing efficient software coding and server virtualization, which can reduce the need to install more physical servers. In addition, long term power purchase agreements with renewable energy providers, or on-site

generation based on fuel cells or other alternative energy sources can provide a hedge against rising energy prices, while enhancing reputation and brand value.

With the emergence of cloud-computing, Big Data analytics, and growth in mobile device usage, an increasing amount of data is being generated and stored globally and the need for computing power is growing. Companies in the industry, therefore, may need to acquire more servers and data centers, significantly increasing the materiality of energy and water consumption. This reflects a shift from data center operations conducted in-house in different industries to the cloud-computing model, which, while important for overall energy savings in the economy (compared to business as usual), creates a need for additional computational and storage capacity, and therefore energy consumption, at the cloud-computing provider’s end.

Evidence

Data centers use between 10 to 20 times more energy than an average commercial building, according to the Electric Power Research Institute.³⁵ Although data centers are becoming more energy-efficient, overall data center energy consumption in the economy is increasing as the number and size of data centers expands.

According to Jonathan Koomey of Stanford University, global data center electricity use doubled from 2000 to 2005, while the rate of growth slowed down between 2005 and 2010. Nevertheless, he estimates that during this latter period, global and U.S. data center

electricity use increased by about 56 percent and 36 percent respectively (to 1.3 percent of global electricity use and two percent of U.S. electricity use in 2010). He attributes the slower growth rate in electricity consumption during this period to the global economic crisis of 2008-2009, the increasing use of virtualization in data centers, and the “data center” industry’s efforts at improving energy efficiency since 2005, following discussions with the U.S. Environmental Protection Agency (EPA).³⁶ This period coincided with large data center building projects from companies such as Microsoft, Google, Yahoo, Apple and Facebook, and significant additional data center leasing deals with wholesale providers of such services, as the provision of cloud-based services expanded.³⁷ In fact, Cisco predicts that by 2016, three out of five data center workloads will be processed in the cloud,³⁸ requiring greater emphasis on energy management by Software & IT Services companies.

Depending on the source of energy and the efficiency of its generation, data centers can contribute significantly to environmental externalities such as climate change. In a white paper on becoming carbon neutral, Microsoft explains that between 2009 and 2012 as it moved to a cloud-computing business strategy, it invested more than \$3 billion to build facilities and networks globally. According to Microsoft, this has significantly increased their use of electricity, which is the primary source of GHG emissions from its operations, and therefore increased the company’s gross GHG emissions.³⁹ Due to these externalities, Software & IT Services companies face customer demand

for greener options. A 2012 customer survey by a cloud-computing provider, Rackspace, found that 20 percent of customers would select a “greener” service provider even if the costs of this option were higher, compared to 26 percent who would choose lower cost, less efficient options. The remaining 54 percent said they would choose the “greener” provider given two equal choices.⁴⁰

Expenditures on energy can be significant in the industry, particularly for data processing and hosting activities. According to estimates from IBISWorld industry reports, the Data Processing and Hosting category of companies have utility costs of about 3.4 percent of total costs.⁴¹ While regulatory incentives related to GHG emissions mitigation have not been implemented consistently across the world or continuously over time, they are likely to increase costs of fossil fuel-based energy and make renewable energy options relatively more attractive in the medium- to long-term. In the U.S., average retail price of electricity for the commercial end-use sector has gone from 7.9 cents per kilowatt-hour (kWh) in 2001 to 10.3 cents per kWh in 2013.⁴² The U.S. Energy Information Administration (EIA)’s long-term projections show that nominal electricity prices paid by the commercial end-use sector will increase to around 18 cents per kWh by 2040 in the Reference case.⁴³ At the same time, as the impacts of climate change intensify, grid disturbances are likely to increase, impacting data center operations. Weather-related significant grid disturbances have been steadily increasing in the U.S. from just over 20 incidents in 2003 to almost 140 incidents in 2011.⁴⁴

Companies have adopted various strategies to lower energy costs and improve efficiencies. The average Power Usage Effectiveness (PUE), a commonly used metric for data center energy efficiency, is 1.8-1.9 (including firms in this industry and in the Internet Media and Services industry), with 1.0 being the theoretically ideal PUE. Some Software & IT Services companies like Microsoft and salesforce.com have achieved lower PUEs of 1.4 and 1.5 respectively.⁴⁵ In Microsoft's Dublin data center, it was able to improve energy efficiency by about 50 percent due to alternative cooling strategies.⁴⁶ According to Autodesk, improvements at its main data center, including new servers, advanced virtualization and smart storage, had lowered energy use and related GHG emissions by 62 percent. These improvements also reduced its IT infrastructure costs by \$7 million annually, representing 15 percent of its IT infrastructure budget.⁴⁷

Companies are also using renewable energy to protect themselves against high energy prices and make their offerings more attractive to their customers. Microsoft has increased its investments in renewable energy purchases, with 46 percent of the electricity it consumes coming from renewables.⁴⁸

Disclosures by companies in their 10-K or integrated reports indicate the materiality of energy management for this industry, especially with growth in cloud-computing. For example, SAP in its 2012 Integrated Report discusses the relevance of energy management to its business: "Managing our energy consumption improves our financial performance, positions us for energy price fluctuations, and enables

us to better serve customers for whom energy management is a priority."⁴⁹ It goes on to say, "We continue to expand our use of renewable energy, both to decrease our reliance on fossil fuels and nuclear power and to support an emerging market that is crucial for both SAP and our customers."⁵⁰ More specifically in relation to data centers, SAP says, "More than 50% of our electricity consumption takes place in our data centers, making it imperative that we increase their efficiency to reduce our cost, energy usage, and related greenhouse gas emissions."

Water consumption at computing facilities is also of material concern to the industry. Data centers consume significant amounts of water for cooling, and although some of the water is returned to the cooling system, a significant amount is evaporated, similar to cooling towers in power plants. Large computing facilities can make significant demands on local water infrastructure; an Amazon.com data center manager estimates that a 15-megawatt facility (which is a small size compared to data centers being built by major software and internet companies) consumes 360,000 gallons of water per day,⁵¹ the equivalent of daily water consumption by 900 American households.⁵²

If local water sources are stressed, or local municipalities do not have the capacity to provide adequate water supply, companies could incur additional costs. For example, the city of Northlake, Illinois had to expand its water capacity to accommodate Microsoft's new data center in the area; the city was expected to recuperate its additional costs through water sales to Microsoft. Furthermore, permitting,

and in turn project timetables, for surface water supplies may be difficult in some areas, especially if waste water is to be returned to the environment.⁵³

Value Impact

Sustainable energy and water consumption can be a strong value proposition for customers looking at “greening” their supply chain, with impact on market share and long-term revenue prospects.

Improving water and energy efficiency can reduce operating costs through lower utility bills, directly affecting profit margins. Such improvements may lead to both short-term cost savings through individual efficiency initiatives, and lower cost structure in the long-term through ongoing efficiency strategies that leverage technological and financial innovation. Additionally, energy efficiency improvements can bring other operational efficiencies such as faster processing of data through efficient coding. Data center energy efficiency solutions like virtualization are also likely to reduce the need for additional servers and other hardware, potentially reducing capital expenditures and rent payments over the medium- and long-term.

Energy efficiency and the use of renewable energy can increase energy independence and mitigate operational risks related to energy availability and reliability as well as price fluctuations, with direct impact on a firm’s risk profile and cost of capital.

As energy and water are key inputs in the strong predicted growth of this industry, the probability and magnitude of these impacts are likely to increase in the future.

SOCIAL CAPITAL

Social capital relates to the perceived role of business in society, or the expectation of business contribution to society in return for its license to operate. It addresses the management of relationships with key outside stakeholders, such as customers, local communities, the public, and the government. It includes issues around access to products and services, affordability, responsible business practices in marketing, and customer privacy.

Financial performance in the Software & IT Services industry depends on companies’ ability to expand market share and ensure customer loyalty and retention. Management of issues related to social capital will enable companies to be well-positioned to deal with emerging regulations and public and customer concerns about the use and protection of customer data. Performance on the issues of data privacy, freedom of expression, and cybersecurity is likely to influence whether companies can attract and retain customers, and build brand value.

Data Privacy & Freedom of Expression

Software and IT services are increasingly delivered over the Internet and on mobile devices, and the amount of data generated as a result is expanding dramatically. Companies in this industry must carefully manage two separate and often conflicting priorities. On the one hand, these companies need the data to innovate and provide customers with new tools based on their preferences and behavior patterns, and to generate revenues, for example, through sales to third parties or use in targeted advertising. On the other hand, companies having access to a wide range of customer data, such as personal, demographic, content, and behavioral data, raises privacy concerns, and has led to regulatory scrutiny from the FTC, authorities in Europe and other jurisdictions (see Legislative and Regulatory Trends section).⁵⁴

These trends are increasing the importance of adopting and communicating in a transparent manner, policies on providing customer data to third parties, including the amount and type of data provided and the nature of its use (for example, for commercial purposes). For example, the proposed Apps Act will require developers to obtain users' consent to terms and conditions governing the collection of their data.⁵⁵

The delivery of software over the Internet also raises concerns about potential access to user data by governments that may misuse it for

limiting the freedoms of citizens. For example, the Chinese version of Microsoft's software Skype, known as TOM-Skype,^v is known to track politically sensitive text messages from its users and send copies of those, along with user information, to its computer servers in the country, sometimes even blocking messages. While it is not clear whether the information is shared with the Chinese government, this practice creates the potential for privacy violations and suppression of the freedom of expression. Users in other countries may also be affected by such requirements of companies in countries like China; for example, an enhancement to TOM-Skype sends information about both senders and recipients to the servers, and this could include users outside China communicating to those within the country.⁵⁶

Recent events related to NSA surveillance of customer data and associated reputational risks for Software & IT Services industries highlight the growing importance of data privacy and freedom of expression.

Software & IT Services companies would benefit from evaluating and disclosing risks and opportunities in markets where freedom of expression and data protection can be compromised. When companies are required to track user information, share data with governments, or modify their services significantly, transparency about their privacy and content practices will enhance their reputation and lower the risk of legal actions or customer backlash against them.

^v TOM-Skype is a joint venture formed in 2005, and the majority owner is a Chinese wireless Internet company.

Evidence

E.U. and U.S. laws on data privacy and protection pose regulatory risks for companies in this industry and demonstrate public concern about this issue. Recent fines by the FTC highlight industry practices leading to data privacy breaches, and the impact on companies. Path Inc., a social networking site, was fined \$800,000 in February 2013 for unauthorized collection of user data; W3 Innovations was fined \$50,000 in 2011 for allowing children to post personal information on public message boards. The FTC's revised children's privacy rules are expected to cost \$270 million for developers of education apps for Apple devices. Apple retains part of the revenues generated through sales of apps for its operating system, and it also gets revenue from advertisements embedded in some applications. Enforcement of data privacy and protection laws may affect companies in this industry directly, or limit the pool of apps being developed for the operating systems of these companies by smaller companies and independent developers. This is likely to affect their revenues, unless companies act to protect user data. For example, Apple vets all apps on its App Store, and it offers a tool for parents to control their children's access to these apps.⁵⁷

Revelations of a broad surveillance program conducted by the U.S. government have raised concerns over user data privacy within corporations and the general public. Companies including Microsoft and Yahoo! recently revealed that they have received official government court requests for data and information

on multiple user accounts, while other sources report that additional content was accessed at international locations.⁵⁸

Customer concerns over data privacy could lead to several billions of dollars in lost contracts at U.S. cloud-computing providers, according to a survey of leading technology companies performed by the Cloud Security Alliance, an organization whose members include many leading technology firms.⁵⁹ In fact, the survey found that ten percent of non-U.S. based respondents had cancelled a project with a U.S.-based cloud-computing provider due to the revelation of the U.S. government surveillance program, while 56 percent indicated they would be less inclined to use a U.S.-based provider. For U.S.-based respondents, 36 percent said the NSA leaks have made the business environment outside the U.S. more challenging. In total, companies may lose between \$21.5 and \$35 billion over the next three years, according to the survey.⁶⁰

Furthermore, a dynamic regulatory environment can affect how some companies in the industry gather useful information on their customers and can increase penalties for data privacy violations. In October 2013, the E.U. introduced draft rules for fines of up to EUR 100 million (\$137 million) or five percent of annual global sales (whichever is greater) for data-protection violations under revisions to the E.U.'s privacy law (discussed in the Legislative & Regulatory Trends section). Previously, the maximum fine imposed on a company by privacy regulators was only EUR 100,000.⁶¹

The leading Software & IT Services companies all disclose data privacy risks in their 10-K filings. In its Form 10-K for fiscal year (FY) 2013, Microsoft says, “Our software products and services also enable our customers to store and process personal data on premise or, increasingly, in a cloud-based environment we host. We believe consumers using our [...] services will increasingly want efficient, centralized methods of choosing their privacy preferences and controlling their data. Perceptions that our products or services do not adequately protect the privacy of personal information could inhibit sales of our products or services, and could constrain consumer and business adoption of our cloud-based solutions.” On increasing business risks related to privacy laws and customer concerns, Adobe disclosed in its Form 10-K for FY 2013 that “New laws and industry self-regulatory codes have been enacted and more are being considered that may affect our ability to reach current and prospective customers, to understand how our products and services are being used, to respond to customer requests allowed under the laws, and to implement our new business models effectively.”^{vi}

Value Impact

Industry players depend on repeat customers for their maintenance or subscription revenues. Therefore, breaches of data privacy or freedom of expression are likely to affect a company's reputation and brand value, and therefore impact market share and revenue. In addition, companies relying on customer data for new products and services or those earning signifi-

cant revenues from the sale of customer data may face limits on new product development and sources of revenue as a result of increasing privacy standards and regulations.

New and emerging data privacy regulations are likely to affect the operational expenses of companies through increased costs of compliance. Companies may face chronic selling, general, and administrative (SG&A) and extraordinary expenses for small but frequent incidents, while high impact low probability data privacy incidents can generate substantial one-time costs to remediate and contingent liabilities, with impact on companies' risk profile and cost of capital.

Software companies operating in countries where privacy and freedom of expression standards are in conflict with the core value of products or services, risk losing their license to operate and a segment of their revenue, increasing their risk profile and cost of capital.

As customers and regulators begin to understand the privacy implications of customer data moving to the systems of Software & IT Services companies and to the Cloud, the probability and magnitude of these impacts are likely to increase in the future.

Data Security

Companies in the Software & IT Services industry and other industries are facing increasing cybersecurity threats from hackers. Software &

^{vi} Form 10-K filings mentioned throughout the document for different companies were obtained from company websites. The fiscal year for the filing is mentioned before each quote throughout the document.

IT Services companies, particularly those providing services through the Internet, need to ensure that policies and processes are in place to manage these risks and that they purchase hardware or develop software that enables them to tackle cybersecurity threats both to their own and their customers' operations.

As hackers get more sophisticated, companies' security systems and anti-virus software products will also need to evolve at the same pace. Data may also be compromised in ways that cannot easily be mitigated by software tools. Perpetrators can use methods of social engineering, whereby they will obtain information or secretly install malware on unsuspecting victim's accounts through, for example, emails containing malware links or phone calls from people pretending to be legitimate company salesmen or customer service representatives.⁶²

Several critical sectors such as the Financials and Infrastructure sectors have a growing dependence on IT and the products and services of Software & IT Services companies. If confidential data from such companies is exposed due to failings on the part of Software & IT Services companies, it could have repercussions for both the retail consumers of such customers and the wider economy. On the other hand, concerns about cybersecurity can also serve as revenue generating opportunities for Software & IT Services companies. President Obama's Executive Order on cybersecurity for critical national infrastructure is likely to create federal contracting opportunities, and growth prospects for serving the critical infrastructure companies mentioned in the Order.⁶³

Evidence

A recent global study on the cost of cybercrime found that the cost, frequency, and time to resolve cyber-attacks increased for four consecutive years. The study finds that the average annualized cost of cybercrime incurred per organization ranged from \$1.3 million to \$58 million. The average time to resolve a cyber-attack was 32 days, with an average cost to organizations of just over \$1 million during this period. The technology sector was among the top five sectors in terms of average annualized costs incurred for FY 2013.⁶⁴

Cybersecurity concerns also provide companies in the Software & IT Services industry with a revenue-generating opportunity. For example, global spending on security software was expected to be greater than \$20 billion in 2013.⁶⁵

Customers of Software & IT Services companies are targets of millions of cyber-attacks every year; as cloud-computing providers gain systemic importance, they are beginning to experience direct attacks on their own software codes and infrastructure. So are other companies in the industry, such as anti-virus software providers. For example, a cloud-hosting company called FireHost blocked more than 64 million cyber-attacks in 2012; while most of these were directed at the company's clients, direct attacks on its own infrastructure are increasing. Savvis, another cloud company, was subject to 400 targeted attacks per month in 2012 on its public application programming interface (API), and attacks were increasing 25 percent per quarter.⁶⁶ Symantec, a computer security company selling anti-virus software,

itself faced hacking of its source code in 2006. While the company stated that the code was outdated and so posed minimum threat to users' data, the incident highlights the risk to the company's customers and at a minimum, to its reputation.⁶⁷

More recently, in October 2013, Adobe, Inc. reported that attackers had gained access to sensitive information including encrypted debit and credit card information for three million customers, and the source code for some Adobe products, including the popular Photoshop program. Ultimately, the company admitted that the security breach compromised 38 million user IDs and passwords.⁶⁸ It is possible that stolen source code could compromise product security and trade secret protection.⁶⁹

There is investor interest in disclosures on the issue of cybersecurity. According to a survey of 405 investors released in February 2013 by security firm HBGary Inc., more than 70 percent of investors are interested in reviewing company cybersecurity practices.^{vii} The SEC issued guidance in October 2011, asking all companies to disclose any material information on cyber-attacks or risks. Furthermore, the SEC has asked companies in several sectors for more information than they provided in their initial 10-K filings.⁷⁰

The leading companies in the industry all disclose business risks related to data security in their 10-K filings, with some discussing actions to mitigate such risks. For example, IBM provides narrative on its multi-faceted security

measures in its Form 10-K for FY 2012, including its "ongoing assessments regarding its technical controls and its methods for identifying emerging risks related to cybersecurity. The company uses a layered approach with overlapping controls to defend against cybersecurity attacks on networks, end-user devices, data centers, and applications."

Oracle discusses risks related to social engineering in its Form 10-K for FY 2013, saying, "...third parties may attempt to fraudulently induce employees or customers into disclosing sensitive information such as user names, passwords or other information in order to gain access to our data, our customers' data or our IT systems."

Value Impact

Companies in the Software & IT Services industry depend on repeat customers for their maintenance or subscription revenues. Therefore, their ability to combat cyber-attacks can affect the competitiveness of their products, with direct impact on market share and revenues. Companies providing services to enhance cyber-security could benefit from significant growth in revenues.

Major investments made by companies in this industry in cloud-computing infrastructure could be put at risk if concerns about the protection of data from hackers affect the demand for, and large-scale transition to, cloud-computing services. In addition, technology and system upgrades may be necessary to meet

^{vii} Note that the survey does not refer only to companies in this industry, but to all companies.

higher standards for data security, resulting in additional R&D and capital expenditures.

New and emerging data security regulations are likely to affect the operating expenses of companies through increased costs of compliance. Companies may face chronic SG&A and extraordinary expenses for small but frequent incidents, while high impact low probability data security incidents can generate substantial one-time costs to remediate and contingent liabilities, with impact on companies' risk profile and cost of capital.

As customers and regulators begin to understand the security implications of increasing amount of data moving to the systems of Software & IT Services companies and to the Cloud, the probability and magnitude of these impacts are likely to increase in the future.

HUMAN CAPITAL

Human capital addresses the management of a company's human resources (employees and individual contractors), as a key asset to delivering long-term value. It includes factors that affect the productivity of employees, such as employee engagement, diversity, and incentives and compensation, as well as the attraction and retention of employees in highly competitive or constrained markets for specific talent, skills, or education.

Companies in the Software & IT Services industry are both affected by and can influence human capital in society, through their workforce recruitment, development, and retention policies. The industry is critical to modern economies, and its expanding workforce correlates with its growing contribution to economies. The U.S. Bureau of Labor Statistics projects that the software publishers industry will see one of the fastest growth among all industries in both employment and real output to 2022, with the annual growth rate in the number of jobs at 2.3 percent, and in real output at 5.7 percent.⁷¹ However, projected growth in industry employment is accompanied by a shortage of employees trained or educated in STEM disciplines. This skills shortage influences a company's decisions regarding developing or recruiting from domestic talent pools, recruiting foreign employees, and offshoring or outsourcing operations. It also affects its ability to ensure diversity in its workforce. Diversity and employee attraction and retention are further influenced by employee engagement and work-life balance at the company.

A Software & IT Services company's ability to attract, develop, and retain talent across its global operations, and facilitate employee diversity, inclusion and performance directly influences the results of operations, while having implications for the development of human capital resources in society.

Recruiting & Managing a Global, Diverse Skilled Workforce

Employees are key contributors to value creation in the Software & IT Services industry, and employee costs are a major proportion of operating expenses. While the number of job openings in the Software & IT Services industry is growing, companies are finding it difficult to recruit qualified employees to fill these positions. This is due in part to a shortage of STEM workers in the U.S. and leads to intense competition among Software & IT Services and Internet Media & Services companies to acquire highly-skilled employees.⁷² The industry experiences high turnover rates due to the labor market power enjoyed by software engineers and other highly-skilled employees.

To respond to the talent shortage for STEM-based skills, companies are actively recruiting foreign nationals for their domestic operations, with risks related to perceived social implications in the host and home countries of workers. Companies are also increasingly outsourcing and offshoring operations, in part to lower costs and meet gaps in the availability of required skills, bringing with it associated sustainability and employee management challenges.

Recruitment of foreign workers can create social tensions in both the host and home

countries of workers, as the broader societal impacts of migration are not always fully understood. While migration of skilled labor benefits the migrating worker, overall, the issue is typically perceived in terms of its negative impacts, which could include 'brain drain' over the longer-term in the home country of foreign workers and negative pressure on wages in the host country.⁷³ As a result, Software & IT Services companies can face uncertainties about the stability and growth of their migrant workforce in the context of social tensions, immigration policy changes, and protectionist tax or trade policies.

Furthermore, studies show that while offshoring of software and IT services work between developed and developing countries can benefit both on the whole, individuals and local communities could be affected negatively, such as through job losses if workers are not able to transfer easily to new roles.⁷⁴ The management of on-shore restructuring as a result of offshoring by Software & IT Services companies therefore becomes critical to maintain strong relations with employees⁷⁵ and policymakers, and to leverage employee skills effectively. As companies begin to offshore core business functions, they also face other business risks. These include violation of IP or data privacy, particularly in countries with different cultural norms or where related laws may differ or not be enforced as rigorously. Furthermore, companies may face challenges in their oversight of operations in different locations. For

example, in India, with increasing participation of women in the workforce, and with software and IT services operations often requiring late working hours, companies may require additional policies and actions to ensure employee safety.⁷⁶

In order to attract employees, improve employee engagement, and therefore retention and productivity, companies offer significant monetary and non-monetary benefits. Additionally, flexible working arrangements are common in the industry, which may, on the one hand, support and respect personal needs leading to greater employee satisfaction and commitment, but on the other hand, have the potential to affect work-life balance negatively. Employee engagement initiatives and flexibility in working conditions might influence the recruitment and retention of a more diverse workforce.

As the industry is characterized by relatively low representation from women and minority groups, Software & IT Services company efforts to recruit from and develop diverse talent pools can serve to address the STEM-talent shortage and generally to improve the value of their offerings. Greater workforce diversity is important for innovation, and helps companies understand the needs of their diverse and global customer base, to be able to design desirable products and services and communicate effectively with customers.

While constrained by low diversity in education and training related to the required skills, companies that are successful in recruiting and developing a diverse and inclusive workforce that at least reflects the make-up of local talent pools and their customers, in providing adequate career support to traditionally under-represented employees, and discouraging implicit biases in promotions have the potential to enhance shareholder value over the long-term.

In general, Software & IT Services companies that are able to put in place education, engagement, training or recruitment policies that develop and leverage the talents of global skilled employees to fill their business needs will likely gain a competitive advantage over peers that are unable to develop talent pools or utilize available ones effectively. In addition, addressing risks associated with a global workforce would reduce the potential negative impacts on value outlined above.

Evidence

Productivity of employees is important for value creation in the Software & IT Services industry, as employees account for a significant proportion of operating costs. Data from the U.S. Census Bureau shows that for 2009, personnel costs (including gross annual payroll and fringe benefits) accounted for about 58.5 percent of total operating expenses for Software Publishers.^{VIII,77}

^{VIII} North American Industry Classification System (NAICS) code 5112, 2002.

As discussed earlier, job growth in the industry is among the fastest in the economy. The industry is finding it difficult to obtain employees with the right skills to fill these positions. Between 2010 and 2020, the number of additional annual computing jobs that will require at least a bachelor's degree^x is expected to be around 120,000; in 2010, however, only approximately 60,000 bachelor's, master's and PhD degrees were awarded in computer science in the U.S. In August 2012, Microsoft had more than 3,400 open research, development and engineering positions in the U.S., a 34 percent increase compared to a year before.⁷⁸

The value of highly-skilled employees and the intense competition among companies to attract them provides such individuals with significant power in the labor markets, leading to high turnover rates. Some software companies experienced turnover at widely differing rates in fiscal year 2012 (between six percent and around 25 percent), averaging 11 percent over the last three years. Companies in the IT Services segment reporting data also have a wide range of turnover rates (between ten and 30 percent), averaging around 16 percent in the last fiscal year.⁷⁹

Companies in the industry are employing various measures to address the skills shortage, including developing local talent pools and recruiting foreign nationals. IBM recently entered into a public-private partnership to launch a program called Pathways in Technology Early College High School (P-TECH). P-TECH aims to enable students to graduate with both a high school diploma and an associate degree

in computers or engineering. Students are also provided an IBM mentor and will be considered for an entry-level job at the company.⁸⁰ At the same time, technology sector CEOs are lobbying for U.S. immigration and education reform for highly-skilled labor, recently setting up an advocacy group called Fwd.us, reflecting the importance of this issue to the industry.⁸¹ In the U.S., Software & IT Services companies apply for among the highest number of H-1 B foreign worker visas, which are limited by annual quotas.⁸²

Companies are also offshoring operations, with associated risks. A 2006 study on software offshoring commissioned by the Association for Computing Machinery (ACM) shows that the software industry will continue to be more globalized and see more offshoring as technology, business processes, education, and national policies evolve. While initial offshoring was focused on standardized, lower value-added tasks, global competition in roles requiring highly-skilled labor, such as research, is increasing, with companies establishing research centers in multiple countries. This has been facilitated by advances in graduate education systems and national research investments in countries like China and India, and the skills shortage in the U.S. The study also highlights risks related to offshored functions, such as potential privacy and security breaches, and company actions related to employees and business processes to mitigate these risks.⁸³

Furthermore, according to UBS, revenues for the Software & IT Services industry could be affected if the "right skills mix" is missing. Cost

^x This refers to overall computing jobs, not limited to software developers or information research scientists.

risks include tensions with labor due to on-shore restructuring caused by offshoring.⁸⁴

Software & IT Services companies provide significant compensation to their employees. The median annual wages in 2012 for occupations in this industry were over 2.5 times more than the median annual wages for all other occupations in the economy.⁸⁵ Some companies provide significant non-monetary benefits, flexible working arrangements, and other amenities to enhance employee satisfaction and engagement and therefore, improve recruitment and retention.

A study on work-life balance among software workers discusses their long hours of work and expectations of flexible working arrangements, autonomy, and significant rewards in return. The study concludes that time flexibility, organizational support for non-work commitments in terms of their effect on career advancement, and low negative work-life spillover are all associated with greater trust in the organization, organizational commitment, and satisfaction with pay, supervision, and career prospects. Evidence not specific to the industry suggests a relationship between these attitudes and actual turnover. The study also highlights continued negative attitudes towards workers taking advantage of family-friendly benefits like career breaks, which could affect the careers of women and those with care responsibilities.⁸⁶

The industry's challenge with acquiring and retaining sufficient talent is further accentuated by relatively low levels of gender diversity and

representation of minority groups in the workforce. While companies in this industry make efforts to recruit a more diverse talent pool, overall industry performance is poor. Only one in five software engineers are women. Women represent only 30 percent of computer and information system managers and computer scientists; and ethnic minorities only around 25 percent.⁸⁷ In part, this is due to the lack of qualified women and minority candidates. A recent study by the Computing Research Center determined that a typical computer and information science undergraduate class at U.S. universities was about 87 percent men, 66 percent white, 15 percent Asian, six percent Hispanic and four percent African-American.⁸⁸

While this can create a 'pipeline' problem, the industry suffers from even lower diversity in leadership positions, suggesting a failure to develop and promote a diverse workforce beyond initial recruitment. For example, the industry median for women on boards in 2011 was about 11 percent for the Software segment, and for women executives, only 3.5 percent.⁸⁹ This does not reflect the proportion of women in engineering or computer science in the workforce, discussed above, indicating potential difficulties in women advancing to leadership positions.

Pay differential among workers is considered both a factor and a symptom of lack of development opportunities for women and minorities, illustrating the potential for implicit or explicit biases, or lack of opportunities to undertake core activities that drive value in

an industry. U.S. Department of Labor data shows that in 2009, women earned around 76 percent of men's salaries in the Information sector.^{x,90} A 2009 study found that in Silicon Valley, men are 2.7 times more likely than women to be promoted to top level jobs such as vice president or senior engineering manager.⁹¹

A diverse and inclusive workforce is increasingly being recognized in Human Resources (HR) literature as contributing to company value. Recent research suggests that companies with effective management of gender diversity, especially at the leadership levels, outperform their peers. For example, companies with sustained high representation of women on their board of directors outperformed those with sustained low representation by 46 percent on Return on Equity.⁹² In a survey of 321 executives from global companies with annual revenues of more than \$500 million, 85 percent of respondents agreed that a diverse and inclusive workforce provides different perspectives and ideas that foster innovation.⁹³

In retail and consumer goods industries, research on the effect of diversity shows that diverse employees understand cultural nuances, enable companies to understand their diverse customer base, and provide better consumer insights. Employee diversity and inclusion in a way that reflects the population overall and the specific communities served,⁹⁴ could enable Software & IT Services companies, particularly those catering to retail customers, to estab-

lish a brand relationship with such customers, improving financial performance.

Although it is difficult to establish general causality between employee diversity and profitability in the economy, academic studies suggest that diversity is likely to add value for high-tech, knowledge-intensive industries such as the Software & IT Services industry.⁹⁵ A 2013 working paper synthesizing research on the impacts of diversity on productivity, wages, and profits finds that when gender diversity increases by one standard deviation in high-tech or knowledge-intensive firms, productivity increases on average by between 2.5 to 6 percent. This can be explained by research suggesting that firms depending on innovations and whose activities involve complex tasks are likely to benefit more from diversity than traditional firms.⁹⁶ The paper concludes that effective diversity management, such that benefits of a more diverse workforce outweigh costs, is critical for a firm's success. For increased productivity to translate into higher profitability "the gains of a more diverse workforce in terms of complementary skills and information sets" need to outweigh "additional costs related to communication and conflicts."

In its Integrated Report for 2012, industry leader SAP discloses various aspects of recruiting and managing a global, diverse workforce. The company stresses the importance of employee engagement and says it is one of four company-wide strategic objectives. It reports a significant decrease in its employee

^x There was no one-to-one match with the Software & IT Services industry, but the Information sector is likely to include such companies.

engagement score from 82 percent in 2006 to 68 percent in 2010, as a result of which it was made a top business priority, with a goal of an 82 percent score by 2015.⁹⁷

Value Impact

Software & IT Services companies' performance in recruiting and managing a global skilled workforce can influence their revenue-generation ability, cost structure and risk profile.

Companies' performance in recruiting and managing domestic STEM-qualified employees and ensuring workforce diversity can lead to value creation in the long-term through stronger innovation, and superior ability to cater to a diverse customer base, with impact on both market share and pricing power. It can also influence their reputation and ability to attract employees, as well as operating costs related to recruiting, developing, and retaining employees. Lastly, the use of employees offshore creates operational risks, including data privacy and security and IP violations, raising companies' risk profile and cost of capital.

As more industries compete for STEM-qualified workers and the debate on the respective social benefits of high-skill immigration and offshoring continues to evolve, the probability and magnitude of these impacts are likely to increase in the future.

BUSINESS MODEL AND INNOVATION

This dimension of sustainability is concerned with the impact of environmental and social factors on innovation and business models. It addresses the integration of environmental and social factors in the value creation process of companies, including resource efficiency and other innovation in the production process, as well as product innovation and looking at efficiency and responsibility in the design, use-phase, and disposal of products.

Software & IT Services companies compete on innovations in products and services, set new trends, and meeting emerging customer demands. As social and environmental issues increase in complexity and their impacts on several industries and consumers in the economy increase in magnitude, Software & IT Services companies are innovating to provide their enterprise and individual customers with tools to address these challenges. Increasingly, companies that are able to meet customer demands associated with sustainability challenges are likely to be able to maintain a competitive edge over the long-term. However, at this time, SASB is considering this issue under its issues "watch list" (see the last section), as the issue does not meet its materiality threshold at present.

LEADERSHIP AND GOVERNANCE

As applied to sustainability, governance involves the management of issues that are inherent to the business model or common practice in the industry and that are in potential conflict with the interest of broader stakeholder groups (government, community, customers, and employees) and therefore create a potential liability, or worse, a limitation or removal of license to operate. This includes risk management, safety management, supply chain and resource management, conflict of interest, anti-competitive behavior, and corruption and bribery. It includes regulatory compliance, lobbying, and political contributions.

In the context of the Software & IT Services industry, governance issues manifest themselves in the form of business disruptions that may have systemic impacts, particularly as cloud-computing expands, and IP protection and compliance with IP laws, which have implications both for innovation and competition.

Managing Systemic Risks from Technology Disruptions

As cloud-computing begins to account for a larger share of industry activity, computing and data storage are moving from individual company servers in various industries to data

centers of cloud-computing service providers, including Software & IT Services companies. As the number and variety of devices connected to each other expands in an ‘internet of things,’ the increase in data storage and computing taking place at host sites is likely to be accelerated. These trends pose risks additional to those of cybersecurity and data privacy discussed above. Systemic or economy-wide disruption may be created if the IT infrastructure of Software & IT Services companies is unreliable and prone to technical errors or other business continuity risks.

Before the cloud-computing era each company had its own set of failure management systems.⁹⁸ With cloud-computing and SaaS, Software & IT service providers need to ensure they have robust infrastructure and policies in place to minimize disruptions to their services. Apart from the Data Privacy and Security issues discussed above, disruptions can occur in the form of programming errors, server downtime, or impacts of extreme weather events and grid disruptions. Disruptions have the potential to generate systemic risks, particularly if the affected customers are in sensitive sectors, for example, financial institutions or utilities, considered as critical national infrastructure.

Business continuity already has material implications for the financial performance of companies in this industry and their ability to attract and retain customers. Systematic “bug” tracking and stability testing, along with data replication, backup systems, and other strategies to ensure continuity of operations are intrinsic practices to this industry. In a world of

cloud-computing and digital interconnectedness, where an increasing number and variety of industries in the economy depend on cloud services, these practices gain systemic importance. Companies recognize these risks; with practices to minimize the probability and magnitude of systemic impacts and improvements in the reliability and quality of their IT infrastructure and services, companies are likely to protect shareholder value.

Evidence

As the industry serves clients in critical sectors of the economy and cloud-computing connects more companies to common infrastructure, defects or operational failures could have system-wide impacts in addition to affecting Software & IT Services companies. An example of the systemic importance of Software & IT Services for the economy is the requirement under the Affordable Care Act for digitization of all medical records, which will require the services of companies in the industry.

Recognition of this issue by companies in the industry highlights its evidence of its materiality. In its Form 10-K for FY 2013, Microsoft discloses that a “disruption or failure of our systems or operations because of a major earthquake, weather event, cyber-attack, terrorist attack, or other catastrophic event could cause delays in completing sales, providing services, or performing other mission-critical functions...Our move toward providing our customers with more services and solutions in the cloud puts a premium on the resilience of

our systems and strength of our business continuity management plans, and magnifies the potential impact of prolonged service outages on our operating results.”⁹⁹

Additionally in its Form 10-K for FY 2012, the company states, “Inefficiencies or operational failures, including temporary or permanent loss of customer data, could diminish the quality of our products, services, and user experience resulting in contractual liability, claims by customers and other third parties, damage to our reputation and loss of current and potential users, subscribers, and advertisers, each of which may harm our operating results and financial condition.”¹⁰⁰

In a similar vein, in its 10-K filing, cloud-based services provider salesforce.com discusses the impacts of defects or disruptions in its services. “Since our customers use our service for important aspects of their business, any errors, defects, disruptions in service or other performance problems could hurt our reputation and may damage our customers’ businesses. As a result, customers could elect to not renew, or delay or withhold payment to us, we could lose future sales or customers may make warranty or other claims against us, which could result in an increase in our provision for doubtful accounts, an increase in collection cycles for accounts receivable or the expense and risk of litigation.”¹⁰¹

The company, like some others providing cloud services (e.g., Amazon AWS), tracks system status in various geographic locations, provid-

ing information on its website on performance issues and service disruptions, including root causes and actions to prevent future incidents. Between 15 February and 19 March 2014, the company reported service disruptions on eight different days in North America. During this period, it was processing at times over 1.5 billion transactions in a day.¹⁰²

Value Impact

Technology disruptions can lead to reputation and brand damage, with long-term impact on market share and revenue. They can also lead to significant extraordinary expenses and contingent liabilities related to contractual liability or claims for damages. In addition, technology and system upgrades may be necessary to address the causes of disruptions. Given the industry's ubiquitous role in providing big data infrastructure, technology disruptions can have a systemic impact that could endanger a company's license to operate in this growing segment, with impact on its risk profile and cost of capital.

As an increasing amount of data is moving to the systems of Software & IT Services companies and to the Cloud and the risk of technology disruption is becoming systemic, the probability and magnitude of these impacts are likely to increase in the future.

Intellectual Property Protection & Competitive Behavior

While IP protection is inherent to the business model of companies in the industry, companies' IP practices can sometimes conflict with the best interests of society. IP protection on the one hand is an important driver of innovation; on the other hand, companies could use it to restrict access to the benefits from innovation, particularly if they are dominant market players. Acquisition of patents and other IP protection can sometimes be used as a strategy to restrict competition. Network effects for some large industry players like Microsoft accentuate the governance issues around IP and anti-competitive practices.

Furthermore, due to the complexity of software products, their abstract nature, and increasing IP rights protection related to software, companies have to navigate overlapping patent claims to be able to operate. At times, companies may require multiple licenses to commercialize a single product. Larger companies such as IBM and Microsoft may have more resources to accumulate patents,¹⁰³ presenting potentially unfair competition. As a result, companies in the industry may find themselves constantly in litigation or subject to regulatory scrutiny either due to allegations of patent violations if they

engage in unethical business practices or are perceived as doing so, or because they themselves are suing others for IP infringement.¹⁰⁴

In the context of IP and its societal contributions, open-source software (OSS) poses an interesting dilemma for companies. It creates opportunities for some companies in the industry – encouraging competition, while posing risks for players that have proprietary software with closely-guarded IP. OSS has several advantages for companies and customers – it improves interoperability and encourages new software to be developed. It can be updated more easily and is often more standards-compliant. On the other hand, it may lack usability, attractiveness and stability. At the same time, due to regulatory pressures or actions, companies like Microsoft are having to unbundle their application software from their operating systems and provide competitors with interoperability information on the latter.¹⁰⁵

Companies that are able to protect their IP and use it to spur innovation resulting in new products and services, while ensuring their IP management practices do not unfairly restrict competition, have the potential to lower regulatory scrutiny and legal actions, while improving revenues.

Evidence

Software & IT Services companies face a growing number of lawsuits related to patent protections, due to the complexities discussed above. The software industry ranked seventh

among all industries in terms of the total number of patent cases with decisions between 1995 and 2012, and sixth between 2007 and 2012, with 70 cases during this period, compared to 14 cases between 1995 and 2000. The increase in cases in this industry is indicative of the overall increase in patents granted by the United States Patent and Trademark Office (USPTO) and patent case filings among all industries, particularly in the last five years.¹⁰⁶

Leading companies in the industry, some with dominant market positions, have faced a number of patent-related lawsuits in recent years. For example, between 2011 and 2013, Microsoft was involved in an average of 40 patent-related lawsuits per year; the corresponding figures for IBM and Oracle were lower at 13 and 9 per year respectively.¹⁰⁷

Companies in the industry spend a significant proportion of their resources on IP generation, including acquiring patents and copyrights. However, they also risk spending substantial amounts in legal costs for enforcing these protections and in penalties or legal costs when legal action is brought against them. For example, in 2012, SAP agreed to pay \$306 million in damages to its competitor Oracle, to avoid a new trial related to copyright infringement, and also agreed to pay Oracle \$120 million for legal fees incurred. In 2010, a jury determined that a subsidiary of SAP was liable for copyright infringement for wrongfully downloading a large number of Oracle files related to its business management software.¹⁰⁸

Microsoft has spent a significant amount of time in anti-trust cases with U.S. and E.U. regulators. A consent decree in the U.S. established in 2002 and later extended prevented Microsoft from entering into agreements that excluded competitors of its Windows software from new computers, and required the company to make Windows interoperable with non-Microsoft software.¹⁰⁹ In 2013, European regulators fined Microsoft around \$730 million for failing to provide users with a choice of Internet browsers, despite a legally binding agreement. The company has been fined over EUR 1.6 billion in the last ten years alone, for abusing its dominant position in the market for PC software.¹¹⁰

In its Form 10-K for FY 2012, Microsoft discusses liabilities incurred and payments made for settling various anti-trust and unfair competition class action lawsuits in the U.S. The company discloses that “At June 30, 2013, we have recorded a liability related to these claims of approximately \$500 million, which reflects our estimated exposure of \$1.9 billion less payments made to date of approximately \$1.4 billion mostly for vouchers, legal fees, and administrative expenses.”

In December 2013, the U.S. Supreme Court agreed to hear arguments on limiting software patents for the first time in decades. The IT industry is broadly divided on the issue, with some firms supporting an open-source, collaborative IP environment, while other companies want to protect proprietary IP. Companies are concerned that relaxing patent laws for software could undermine their business

model, and an eventual ruling could deeply affect valuations if some types of software can no longer be patented. A ruling in favor of limiting software patents could alter how some companies value their intellectual property. The court’s review has no defined timeline,^{111,112} but the review suggests that the issue of IP protection and competitive behavior is likely to pose higher risks for the industry in the future.

Leading companies in the industry all discuss IP protection, several of them discussing related lawsuits and some disclosing risks related to anti-trust laws. IBM for example, discusses in its Form 10-K for FY 2012 claims and counterclaims with a company called SCO Group regarding copyright infringement and unfair competition related to UNIX IP rights. CSC discusses in its 10-K for FY 2013 that it may inadvertently infringe on IP rights of others, and says that the expense and time of defending against claims made against them may have a material and adverse impact on the company’s profitability. It goes on to say, “Additionally, the publicity we may receive as a result of infringing intellectual property rights may damage our reputation and adversely impact our ability to develop new business.”

Symantec’s Form 10-K for FY 2013 highlights growing risks of IP protection issues, stating, “Because of constant technological change in the segments in which we compete, the extensive patent coverage of existing technologies, and the rapid rate of issuance of new patents, it is possible that the number of these claims may grow.”

Value Impact

Software & IT Services companies can face extraordinary expenses and contingent liabilities from adverse legal or regulatory rulings related to anti-trust and IP. Such rulings may also affect a company's market share and pricing power if its patents or dominant position in key markets are legally challenged, with significant impact on revenue. Strong reliance on IP and market dominance can also be a source of risk if they are vulnerable to legal challenge, increasing the risk profile of companies and their cost of capital. Risk profile can be impacted further by possible changes to the regime of IP protection for software.

SASB INDUSTRY WATCH LIST

The following section provides a brief description of sustainability issues that did not meet SASB's materiality threshold at present, but could have a material impact on the Software & IT Services industry in the future.

Delivering Sustainability Solutions for Customers

Sustainability-related IT solutions for customers are contributing to long-term value creation as companies in the Software & IT Services industry look to expand their offerings, provide more high-value services, and acquire customers in emerging markets, where sustainability challenges may be more acute. The impact of such initiatives on company value is likely to increase over time.

Business, government, and retail customers of Software & IT Services companies face growing environmental, social, and governance challenges, including those related to operational risk management, product safety, sustainable supply chains, sustainability analytics and reporting, and energy and environmental resource management. Through intelligent IT services that leverage the capabilities of cloud computing, data analytics, machine learning, and machine-to-machine communication to enable customers to address their sustainability concerns, companies in the industry will be able to meet evolving customer needs and expectations, differentiate their offerings, increase brand value, and expand their addressable market.

Research not specific to this industry shows that companies now consider 'sustainability' investments as important growth drivers (as opposed to risk mitigation strategies) and as being motivated by customer expectations. About 60 percent of 250 senior executives surveyed by PricewaterhouseCoopers indicate that their companies charge their customers premiums for sustainable products and services, with 68 percent of those charging premium amounts in the range of 5 to 20 percent. Furthermore, 37 percent of respondents said they cannot maintain pace with customer demand for sustainable products and services. Companies are looking at both creating new services for existing markets and also expanding into new markets for sustainability services.^{113,114}

According to UBS, "'Green IT' initiatives are becoming more important as a means of differentiating vendors' offerings."¹¹⁵ Sustainability and Oekom both cite examples of Software

& IT Services company actions on sustainability products and services, including a target by NTT Data for net sales of its eco-friendly services.¹¹⁶ Sustainalytics adds that despite there being some leaders providing smart grid technologies, data center management, and strategic consulting, only 41 per cent of software and services companies tracked by them “provide sustainability-related products and services that are of particular benefit to the environment or the society with a clear sustainability dimension.”¹¹⁷

Companies in the Software & IT Services industry can create significant value propositions for customers with solutions that create environmental efficiencies. For example, SAP’s solutions for energy management in heavy industry have saved customers an estimated \$550 million and averted 5.7 million tons of carbon emissions.¹¹⁸

An analysis by the United Nations Global Compact and Accenture, Inc. of the *Sustainable Energy for All* initiative, an effort by the United Nations to facilitate action on sustainably meeting the energy requirements of business and society, lists software products and IT services including virtualization and smart grid software as top business drivers to enhance customer energy efficiency.¹¹⁹

Evidence suggests that the market for sustainability solutions is growing, although it is still a small fraction of industry revenues. Forrester Research estimated that the global Green IT consulting services and IT-for-Green consulting services markets were worth \$1.4 billion and \$756 million respectively in 2010.¹²⁰ The company had also forecast that the market for enterprise carbon and energy management software could reach \$1 billion by 2013. While this is a small size compared to total Software & IT Services revenues of close to \$1 trillion, the market for such software more than doubled from 2009 to 2010 to \$163 million, with early adopters including manufacturing, utilities, and public sector companies.¹²¹

According to research by Groom Energy, over 2011 and 2012, more than 600 large corporations purchased software to aid sustainability tracking and reporting, compared to 50 large companies making such purchases in 2009. Key drivers of such investments include requests by customers for environmental data, motives to enhance brand image and loyalty, and cost savings from improved energy efficiency.¹²² While the increase in purchases is significant, it was considerably lower than originally forecast by Groom, suggesting that difficulties in forecasting demand accurately for sustainability products and services may pose challenges to manage and deliver sustainability solutions to customers.

APPENDIX I: Five Representative Companies | Software & IT Services^{XI}

COMPANY NAME (TICKER SYMBOL)
International Business Machines (IBM)
Microsoft (MSFT)
Oracle (ORCL)
SAP – ADR (SAP)
CSC, Inc. (CSC)

^{XI} This list includes five companies representative of the Software & IT Services industry and its activities. This includes only companies for which the Software & IT Services industry is the primary industry, that are U.S.-listed but are not primarily traded Over-the-Counter, and where at least 20 percent of revenue is generated by activities in this industry, according to the latest information available on Bloomberg Professional Services. Retrieved on 23 January 2014.

APPENDIX IIA: Evidence for Material Sustainability Issues

	EVIDENCE OF INTEREST			EVIDENCE OF FINANCIAL IMPACT				FORWARD-LOOKING IMPACT			
	HM (1-100)	IWGs		EI	Revenue / Cost	Asset/ Liabilities	Cost of Capital	EFI	Probability/ Magnitude	Exter- nalities	FLI
		%	Priority								
Environmental footprint of hardware infrastructure	93	89	5	Medium	•		•	Low	•	•	Yes
Data privacy & freedom of expression	80	93	3	High	•	•	•	High	•	•	Yes
Data security	N/A	98	1	High	•	•	•	High	•	•	Yes
Recruiting & managing a global, diverse skilled workforce	60	85	2t	Medium	•	•	•	High	•	•	Yes
Managing systemic risks from technology disruptions	N/A	91	2t	High	•	•	•	High	•	•	Yes
Intellectual property protection & competitive behavior	80	93	4	High	•	•	•	Medium			No

HM: Heat Map, a score out of 100 indicating the relative importance of the issue among SASB's initial list of 43 generic sustainability issues. The score is based on the frequency of relevant keywords in documents (i.e., 10-Ks, shareholder resolutions, legal news, news articles, and corporate sustainability reports) that are available on the Bloomberg terminal for the industry's publicly listed companies.

IWGs: SASB Industry Working Groups

%: The percentage of IWG participants that found the issue to be material. (-) denotes that the issue was added after the IWG was convened.

Priority: Average ranking of the issue in terms of importance. One denotes the most material issue. N/A denotes that the issue was added after the IWG was convened.

EI: Evidence of Interest, a subjective assessment based on quantitative and qualitative findings.

EFI: Evidence of Financial Impact, a subjective assessment based on quantitative and qualitative findings.

FLI: Forward Looking Impact, a subjective assessment on the presence of a material forward-looking impact.

APPENDIX IIB: Evidence of Financial Impact for Material Sustainability Issues

	REVENUE & EXPENSES						ASSETS & LIABILITIES				RISK PROFILE	
	Revenue		Operating Expenses		Non-operating Expenses		Assets		Liabilities		Cost of Capital	Industry Divestment Risk
	Market Share	Pricing Power	COGS	R&D	CapEx	Extra-ordinary Expenses	Tangible Assets	Intangible Assets	Contingent Liabilities & Provisions	Pension & Other Liabilities		
Environmental footprint of hardware infrastructure	•		•		•						•	
Data privacy & freedom of expression	•		•			•		•	•		•	
Data security	•		•	•	•	•		•	•		•	
Recruiting & managing a global, diverse skilled workforce	•	•	•					•			•	
Managing systemic risks from technology disruptions	•			•	•	•		•	•		•	
Intellectual property protection & competitive behavior	•	•				•			•		•	

■ HIGH IMPACT ■ MEDIUM IMPACT

APPENDIX III: Sustainability Accounting Metrics | Software & IT Services

TOPIC	ACCOUNTING METRIC	CATEGORY	UNIT OF MEASURE	CODE
Environmental Footprint of Hardware Infrastructure	Total energy consumed, percentage grid electricity, percentage renewable energy	Quantitative	Gigajoules, Percentage (%)	TC0102-01
	Total water withdrawn, percentage recycled, percentage in regions with High or Extremely High Baseline Water Stress	Quantitative	Cubic meters (m ³), Percentage (%)	TC0102-02
	Description of the integration of environmental considerations to strategic planning for data center needs	Discussion and Analysis	n/a	TC0102-03
Data Privacy & Freedom of Expression	Discussion of policies and practices relating to collection, usage, and retention of customers' information and personally identifiable information	Discussion and Analysis	n/a	TC0102-04
	Percentage of users whose customer information is collected for secondary purpose, percentage who have opted-in	Quantitative	Percentage (%)	TC0102-05
	Amount of legal and regulatory fines and settlements associated with customer privacy ^{xii}	Quantitative	U.S. dollars (\$)	TC0102-06
	Number of government or law enforcement requests for customer information, percentage resulting in disclosure	Quantitative	Number, Percentage (%)	TC0102-07
	List of countries where core products or services are subject to government-required monitoring, blocking, content filtering, or censoring ^{xiii}	Discussion and Analysis	n/a	TC0102-08
Data Security	Number of data security breaches and percentage involving customers' personally identifiable information ^{xiv}	Quantitative	Number, Percentage (%)	TC0102-09
	Discussion of management approach to identifying and addressing data security risks	Discussion and Analysis	n/a	TC0102-10

^{xii} Note to **TC0102-06** – Disclosure shall include a description of fines and settlements and corrective actions implemented in response to events.

^{xiii} Note to **TC0102-08** – Disclosure shall include a description of the extent of the impact in each case and, where relevant, a discussion of the registrant's policies and practices related to freedom of expression.

^{xiv} Note to **TC0102-09** – Disclosure shall include a description of corrective actions implemented in response to data security incidents or threats.

APPENDIX III: Sustainability Accounting Metrics | Software & IT Services

TOPIC	ACCOUNTING METRIC	CATEGORY	UNIT OF MEASURE	CODE
Recruiting & Managing a Global, Diverse Skilled Workforce	Percentage of employees that are (1) foreign nationals and (2) located offshore ^{xv}	Quantitative	Percentage (%)	TC0102-11
	Employee engagement as a percentage ^{xvi}	Quantitative	Percentage (%)	TC0102-12
	Percentage of gender and racial/ethnic group representation for: (1) executives and (2) all others	Quantitative	Percentage (%)	TC0102-13
Managing Systemic Risks from Technology Disruptions	Number of (1) performance issues and (2) service disruptions; total customer downtime ^{xvii}	Quantitative	Number, Days	TC0102-14
	Discussion of business continuity risks related to disruptions of operations	Discussion and Analysis	n/a	TC0102-15
Intellectual Property Protection & Competitive Behavior	Number of patent litigation cases, number successful, and number as patent holder	Quantitative	Number	TC0102-16
	Amount of legal and regulatory fines and settlements associated with anti-competitive practices ^{xviii}	Quantitative	U.S. dollars (\$)	TC0102-17

^{xv}Note to **TC0102-11** – Disclosure shall include a description of potential risks of recruiting foreign nationals and/or offshore employees, and management approach to addressing these risks.

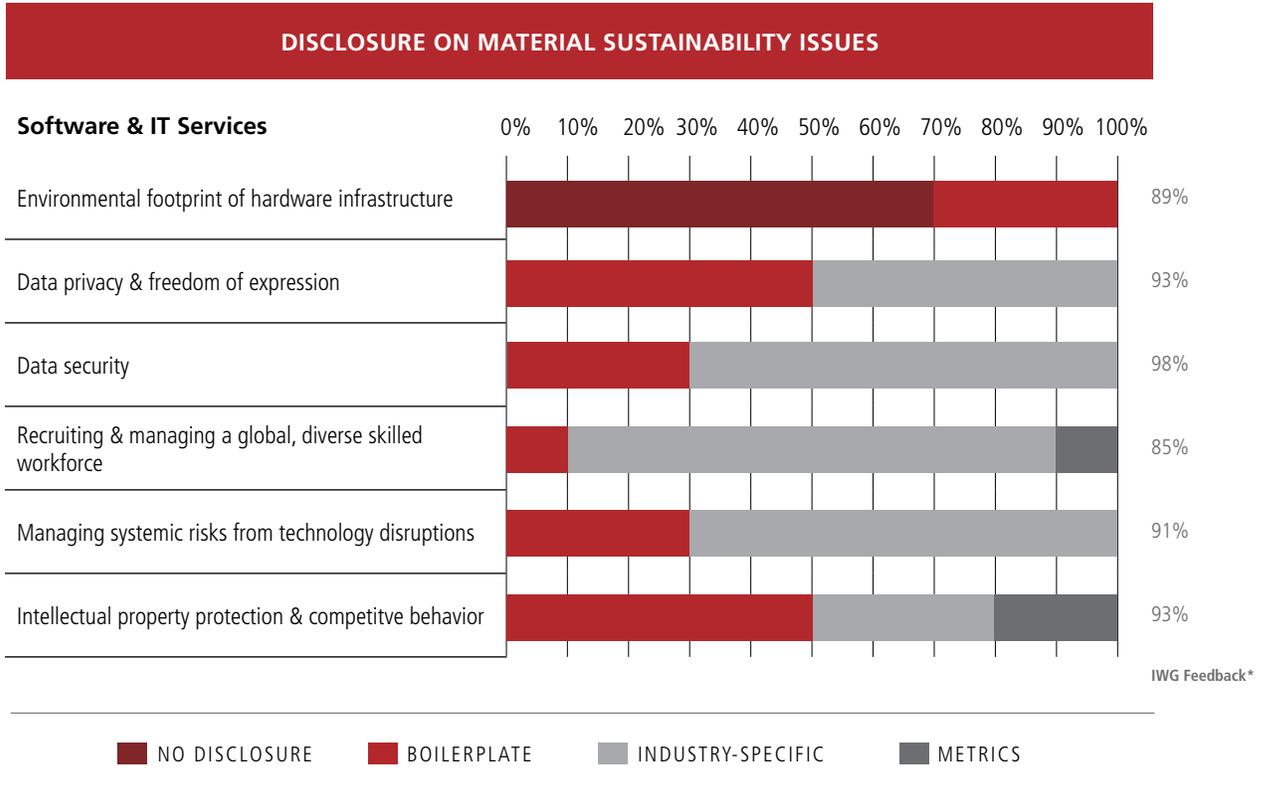
^{xvi} Note to **TC0102-12** – Disclosure shall include a description of methodology employed.

^{xvii} Note to **TC0102-14** – Disclosure shall include a description of each significant performance issue or service disruption and any corrective actions taken to prevent future disruptions.

^{xviii} Note to **TC0102-17** – Disclosure shall include a description of fines and settlements and corrective actions implemented in response to events.

APPENDIX IV: Analysis of 10-K Disclosures | Software & IT Services

The following graph demonstrates an aggregate assessment of how the top ten U.S. domiciled companies, by revenue, in the Software & IT Services industry are currently reporting on material sustainability issues in the Form 10-K.



*Percentage of IWG participants that agreed issue was material

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