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The Society for Information Management's (SIM) Advanced Practices Council (APC) is an exclusive forum for senior IT executives who value directing and applying pragmatic research; exploring emerging IT issues in-depth; and hearing different, global perspectives from colleagues in other industries.

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Executive Summary

Digital technology platforms have become the foundation for an increasing share of economic activity resulting in a changing business environment. Digital transformation – the reinvention of a company's vision and strategy, organizational structure, processes, capabilities, and culture to match the evolving digital business context – is not only changing companies but also redefining markets and industries.

Executives require frameworks to guide their transformations and assess their digital journeys over time. Since digital transformation is a comprehensive reinvention effort, it requires more than a set of digital initiatives. Since digital transformation often requires broad reinvention, a useful framework must encompass strategic, technological, human capital, and organizational cultural considerations.

Six dimensions of digital transformation at the enterprise level emerged from as those that position a company for a successful competitive stance due to digital transformation. They are: a company's strategic vision, alignment of the vision and its investments in digital transformation, the suitability of the culture for innovation, possession of sufficient intellectual property assets and knowhow, the strength of its digital capabilities (talent), and its use of digital technologies.

The six-dimension framework facilitates benchmarking one's company with others in the Center for Digital Transformation's database - either within a sector or against companies that are in the same state of progress towards digital transformation. In addition, executives can measure their company's progress over time. Perhaps most importantly, the framework helps diagnose gaps in a company's capabilities by identifying how it performs across each of the six dimensions relative to any comparison group.

Since the imperative to exploit digital technologies will continue for the foreseeable future, the end goal isn't fixed. Rather, the state of the possible will keep advancing and the finish line will keep moving outwards. Although no approach to assess progress in digital transformation can ever be perfect given the scope of the effort, we believe the provided framework provides a useful means to measure a company's progress.

Introduction

Business success depends on understanding how external forces such as globalization, demographics, and sustainability impact a company's competitive strategy and position. Success also depends on exploiting powerful and reasonably-priced digital infrastructures that include mobile technologies, especially smart phones; cloud computing, especially software-as-a-service for such applications as artificial intelligence and machine learning; wired and wireless networks, and the Internet of Things. In fact, digital technology platforms have become the foundation for an increasing share of economic growth.

Digital technologies enable the development of new or enhanced products and services delivered to customers more efficiently. And such technologies enable fundamentally new ways to organize business. Digital transformation allows for reinventing the company - its vision and strategy, organizational structure, processes, capabilities, and culture. Such transformations not only change companies, but also markets and entire industries.

Consider some examples drawn from different industries.

Today's cars are computers on wheels, with the average car incorporating 100 million lines of code. The software in cars powers safety systems, personalized entertainment, navigation, and autonomous capabilities. Moreover, by providing a substitute for car ownership, ridesharing companies such as Lyft reduce the value of the traditional (end-customer) ownership model. In light of these developments, digital transformation for traditional automakers involves digitizing their product (building software-intensive vehicles that will ultimately drive themselves), understanding and preparing for ownership models for cars in the future, ensuring that they have the appropriate technology capabilities and talent, and building a culture that enables change.

Automakers have adopted different transformation strategies to adapt to these technology-driven shifts. For example, to acquire self-driving capabilities that it could incorporate into its cars, GM bought autonomous driving software startup Cruise Automation to give it a jumpstart on the development process. To understand new models of use, it invested $500 million in ridesharing company Lyft and launched Maven (a Zipcar-like service where one can rent a car by the hour). It also brought software development capabilities back in-house. This is digital transformation in action: a redefined vision and strategy, including developing new digitally-enabled products and services, experimenting with new sharing business models, investing in and building key digital capabilities both by acquisition and in-sourcing, and aligning its investments with the vision.

Disney Theme Parks has also adapted its business to the digital world. In order to enhance the guest experience, Disney invested $1B in MyMagic+, a software platform that allows visitors to optimize their experience at DisneyWorld. MyMagic+ subsumes Disney’s other software initiatives (FastPass ride reservations, advance dining reservations, onsite photography services, and resort access) through a simple RFID-enabled wristband. The system gives Disney a far better understanding of its business, allowing it to dramatically improve the customer experience, raise the operating efficiency of its assets and people, improve throughput, and increase revenues.

Counter-intuitively, Disney improved customer experience while simultaneously increasing the number of daily guests at the parks.

Shipping giant Maersk is reinventing itself as a logistics company by launching a blockchain platform company in partnership with IBM for tracking the provenance of goods shipped using its services. The tracking of goods – from producers to packers to freight forwarders to shipping companies and back to freight forwarders and delivery companies – is complex yet structured. In addition to all of the paperwork that must be exchanged between the various parties mentioned above and with the customs authorities, a well-designed and auditable system can improve the efficiency and timeliness of commercial shipping.

These examples illustrate how the digital landscape is fundamentally changing the context in which businesses operate across diverse industries. Given the shift to a digital world, businesses can no longer rely on thinking and behavior suited only to the physical world. Managers in today's competitive landscape must recognize and anticipate technology-enabled change, estimate its potential impact, and understand how to leverage digital technology to create and capture value for their companies. Managing in a digital world requires rethinking the company's strategies, business models, and key business drivers for success. Although all companies must continually anticipate and react to changing business environments, the challenge is far greater for long-standing companies that enjoyed success in a primarily physical world.

In the last five years, the conversation regarding digital transformation at many companies has shifted substantively. Initially, the challenge was to convince senior executives of the business imperative to change. Today, there is widespread recognition among executives of the need to transform their businesses for the digital world. These executives seek frameworks to guide their transformations.

Through research sponsored by the Advanced Practices Council, we developed such a framework. We designed it to be applicable across industries because industry boundaries are blurring. The framework consists of six dimensions that together comprise the factors for achieving successful digital transformation. These dimensions include a company's strategic vision, the alignment of the vision and its investments in digital transformation, the suitability of the culture for innovation, possession of sufficient intellectual property assets and knowhow, the strength of its digital capabilities (talent), and its use of digital technologies.

Executives can either use the questions included for each dimension as a checklist for exploring readiness for digital transformation success or can complete an online survey that results in a report that not only presents the composite sense of company executives on these six dimensions but also benchmarks the company's scores against companies that consider themselves significantly ahead of their competitors in leveraging digital transformations. The benchmarks were created through a survey of senior executives at 129 U.S. public companies and 18 large private companies over the three-month period December 2016 to February 2017. Database details can be found in the Appendix.

Dimensions of Digital Transformation

Since digital transformation often requires broad reinvention, a useful framework must encompass strategic, technological, human capital, and organizational culture considerations.

Competitive advantage frequently results from ideas that lead to new businesses and innovative business models, produce better products and services, and drive productivity and efficiency. Such ideas don't scale easily unless they are codified into software and leveraged with digital platforms. Simultaneously, physical assets, which once conferred competitive advantage on their owners, are increasingly commoditized. Global supply chains have amplified this trend. As a result, there has been a crucial shift in the source of competitive advantage to software. Value creation through software requires a redefined vision and strategy, alignment of business and digital strategies, identification and codification of valuable IP and knowhow, a culture of innovation, technical talent, and digital technology capabilities.

Specifically, six enterprise level dimensions of digital transformation emerged from our research as those that can position a company for a successful competitive stance due to digital transformation. They are:

1. Strategic vision (for a digital world)
2. Culture of innovation
3. Knowhow and intellectual property (IP) assets
4. Digital capabilities (talent),
5. Strategic alignment
6. Technology assets

Of course, these dimensions are comprised of multiple elements. We identified those items that best captured the underlying aspects of each of the dimensions using the statistical technique of factor analysis.

Strategic Vision

The items that comprise strategic vision, presented in Table 1, represent two categories of measures. The first captures the existence of a strategic vision for the company in an ever more digital world and a strategy for executing on the vision. The second captures whether the executive team has the capabilities to define and lead a digital transformation strategy.

Dimension: Strategic Vision
• A clearly defined strategic vision mapped to an understanding of digital needs • Company has a strategy for digital transformation • Senior executive team has a clear understanding of digital technology capabilities and how it will support business objectives • No problem with lack of digital leadership to define strategy • No difficulty developing company digital strategy

Table 1: Strategic Vision

Culture of Innovation

The items that comprise culture of innovation, presented in Table 2, attempt to capture the presence of management practices that encourage innovation, including compensation metrics and a view of failure, along with the respondent's assessment of the culture.

Dimension: Culture of Innovation
• There is a culture of innovation and risk-taking • New ways of thinking and solutions from diverse perspectives are encouraged • Failure while taking a calculated risk is to be learned from; it is not a black mark on one's career. • Innovators are rewarded • No problem with cultural resistance

Table 2: Culture of Innovation

Knowhow and Intellectual Property

These dimensions, presented in Table 3, are aimed at understanding whether a company has sufficient knowhow and intellectual property assets to compete and how well it leverages its knowhow. Knowhow doesn't scale easily unless it is codified in software run on digital platforms. The items in this category include questions on the various dimensions of value: operations, customer understanding, and product development. The measure also considers whether the company possesses sufficient IP assets to implement the strategic vision.

Dimension: Knowhow and Intellectual Property
• Increasingly using software to improve operations performance • Increasingly using software to improve customer understanding • Increasingly using software to improve product knowhow • Sufficient intellectual property assets to implement strategic vision • Increasingly using software to improve supplier interactions

Table 3: Knowhow and Intellectual Property

Digital Capabilities

The items that comprise digital capabilities, presented in Table 4, include the talent available in the company to support digital transformation. These items include the availability of expertise at both the strategic and technical levels, and the level of skills it possesses to define and execute its digital strategy.

Dimension: Digital Capabilities
• Availability of digital expertise • Overall, there are necessary visionary/innovative skills within the company to define the right digital strategy • Grades assigned to individuals based on their level of digital transformation knowledge • Technical talent for innovation is already available in the company • No problem with lack of digital skills to execute strategy

Table 4: Digital Capability

Strategic Alignment

The items that comprise strategic alignment, presented in Table 5, capture a company's ability to make financial investments in digital transformation that correspond to its strategic vision. These items include whether the company makes the necessary financial commitments, supports funding strategic digital initiatives with uncertain returns, and is willing in the short run to cannibalize existing revenue streams and business.

Dimension: Strategic Alignment
• Company willing to fund strategic digital initiatives with uncertain returns • Willingness in the short run to cannibalize existing revenue streams and business models to gain profit in the long run • Collaboration and alignment between M&A, digital and business unit teams • No problem with lack of budget/resources assigned to digital transformation • Investment increase in new forms of software over past three years

Table 5: Strategic Alignment

Technology Assets

The items that comprise technology assets, presented in Table 6, capture the level of the company's use of newer digital technologies. The final set of items included in this dimension are the level of use of Big Data, data mining and analytics, mobile technologies, cloud computing and Internet and wireless communications.

Dimension: Technology Assets
• Technology in use: big data • Technology in use: data mining and analysis/data analytics • Technology in use: mobile technologies • Technology in use: cloud computing • Internet and wireless communications • Sufficient technology assets to implement strategic vision

Table 6: Technology Assets

Assessing Progress in Digital Transformation

How well do the six dimensions necessary for digital transformation reflect advancement in a company's journey? One test is the extent to which the elements discriminate among companies by how far along they are in their journey.

We asked respondents to report how their company compared with its closest competitors in terms of leveraging digital technologies. Companies could report being significantly or slightly behind, on par with, and slightly or significantly ahead of their competitors. We grouped the companies in our sample into the four categories: *behind*, *on par*, *slightly ahead*, and *significantly ahead*.

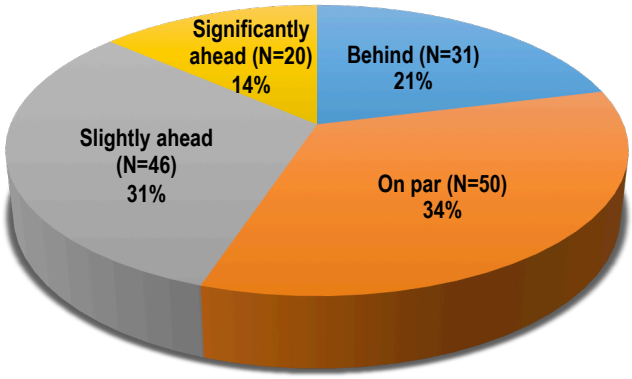

Figure 1: Company Comparison with Competitors

Next, we computed a category score for each of the six dimensions. Specifically, we defined the category score as the median score of all the companies in the category. For example, there are 20 companies that rate themselves as significantly ahead of their competitors. Let's consider how they perform on the dimension of strategic vision. The median score for strategic vision among the companies in this category is 4.67, which means that half the companies score above 4.67 and half score below. Similarly, we computed the distribution of the companies arranged by their scores for all six dimensions.

Table 7 displays the score for all dimensions for the companies in each category: behind, on par, slightly ahead, and significantly ahead of their competitors. The numbers in each column are higher as we move from left to right, which is consistent with the category score increasing with the state of advancement. That is, the category scores for all six dimensions for companies that are significantly ahead are higher than the corresponding score in any of the other (less accomplished) categories. Similarly, companies that are slightly ahead of their competitors score higher than companies that are on par with or behind them. For example, companies that are significantly ahead have a median score of 4.67 on strategic vision compared to 3.8 at companies that are slightly ahead and 3.2 at companies that are on par with their competitors, and so on. In essence, in any category, companies score higher on all six dimensions than companies that are less

advanced, and lower than companies that are ahead of them, giving us the confidence to say that our measures are consistent with digital progress.

Scale	Behind	On Par	Slightly Ahead	Significantly Ahead
Strategic Vision	3.00	3.20	3.80	4.67
Culture of Innovation	3.60	3.80	3.80	4.40
Knowhow and IP	3.40	3.40	3.80	4.10
Digital Capabilities	2.90	3.20	3.80	4.30
Strategic Alignment	2.90	2.80	3.40	4.00
Technology Assets	3.10	3.50	3.80	4.30

Table 7: Median Score for Dimensions by Level of Advancement

Figure 2 provides an alternative representation of the relative positioning of the six dimensions for each level of advancement in a spider chart, which makes a compelling case for the appropriateness of our assessment methodology. The line representing companies that are significantly ahead are in yellow, slightly ahead in gray, on par in orange, and behind in blue. What jumps out from the picture is that each category's representation is completely to the outside of a less advanced category.

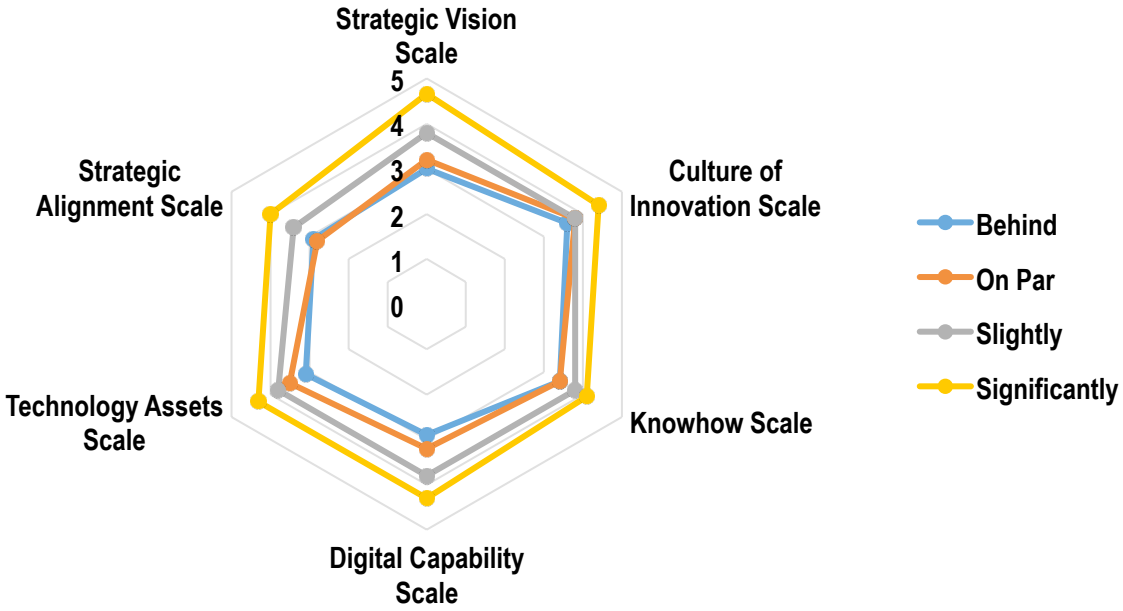

Figure 2: Dimensions of Enterprise Digital Transformation by Level of Advancement

The spread between the categories is particularly illustrative. The largest difference in the category scores between companies that are behind and companies that are significantly ahead is in strategic vision (1.6) and the lowest is in knowhow and IP (0.7). In the latter case, the smaller difference is explained by the fact that the category score for knowhow for firms that are

significantly ahead is 4.1 which indicates that even these firms have more to do on this dimension. In the case of culture of innovation, only firms that are significantly ahead are doing substantially better than the others, which are tightly clustered.

Those companies that are significantly ahead of their competitors score the highest on each of the six dimensions while those companies behind their competitors score much lower on each of the scales. If we look at each dimension individually, we can derive additional insights. For example, those companies significantly ahead of their competitors have achieved their highest scores on the dimensions of strategic vision (4.67) and culture of innovation (4.4), and the lowest (of the six) scores for strategic alignment (4.0). All scores are 4.0 or greater. Companies that are on par with their competitors score highest on culture of innovation (3.8) and lowest on strategic alignment (2.8) with the other dimensions ranging between 3.2 and 3.5. Companies that are behind their competitors score highest on culture of innovation (3.6) and lowest on strategic alignment (2.9) and digital capabilities (2.9).

We see the biggest differences between high performing and low performing companies on the dimensions of strategic vision, digital capabilities, and technology assets. This suggests that companies that would like to progress with transformation should begin at the top. Companies that have a well-articulated strategic vision are more likely to make the investments in technology assets and talent.

Measuring Your Company on the Dimension Scales

The scales associated with each dimension provide a useful way for a company to identify the strengths and weaknesses in achieving change in the organization. They can also be used to identify over time whether processes and procedures they initiate are achieving the intended goals.

To illustrate how the scales for each dimension can be applied, we display individual plots for four companies, one from each category of progress in achieving digital transformation. We selected these companies because their plots depict representative patterns while highlighting different strengths and weaknesses.

Internet Publisher

Respondents from the Internet publisher assessed the company as significantly ahead of its competitors, who offer similar services. This company has relatively high scores on all six elements with technology assets and digital capabilities achieving the highest scores. Relatively speaking, it doesn't rate itself as highly on its knowhow and strategic alignment. It should develop differentiated knowhow to distinguish itself from its competitors and invest in aligning its investments with its strategic vision.

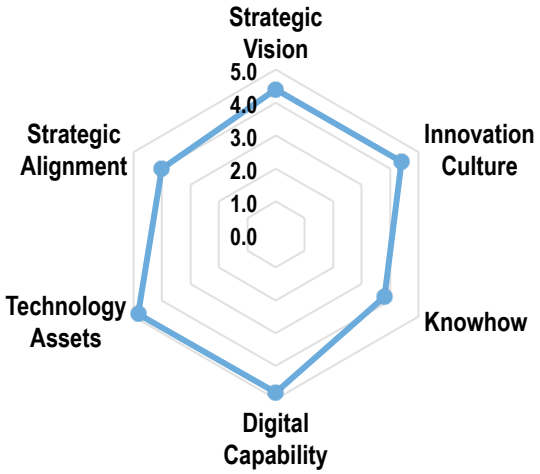

Figure 3: Internet Publisher

Lodging Company

The lodging company, which assessed itself as slightly ahead of its competitors, is well established. It scores high on its strategic vision, and on its technology assets, digital capabilities, and knowhow, but is challenged by its culture and ability to make investments aligned with the vision. This company should explore ways to change its culture through new management and organizational practices as well as investment processes.

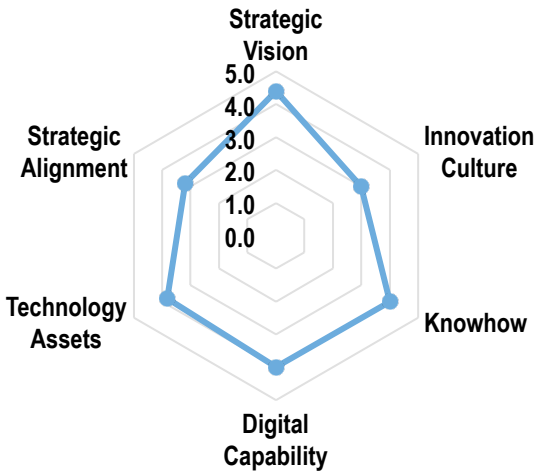

Figure 4: Lodging Company

Retail Company

The retail company, which assessed itself as being on par with its competitors, is relatively balanced across all but one of the dimensions, though its absolute scores are not particularly high. It does well at technology assets and digital capabilities, which isn't surprising for a retailer, but performs poorly on strategic alignment. This is a company that struggles with aligning its business strategy with a digital world.

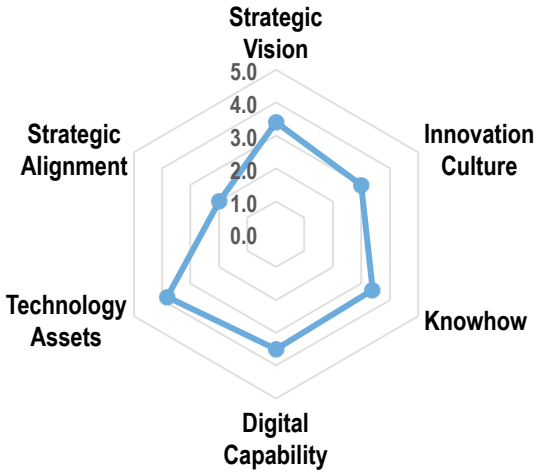

Figure 5: Retail Company

Pharmaceutical Company

The pharmaceutical company has an atypical profile. Respondents assessed the company as behind its competitors. Not surprisingly, it performs poorly on most dimensions. It is short on digital capabilities and struggles to align its business for the digital world. It does score very highly on

culture of innovation. At first glance, this may seem odd, but on reflection, this is consistent with its industry, which by the very nature of its products and research, has a strong emphasis on innovation.

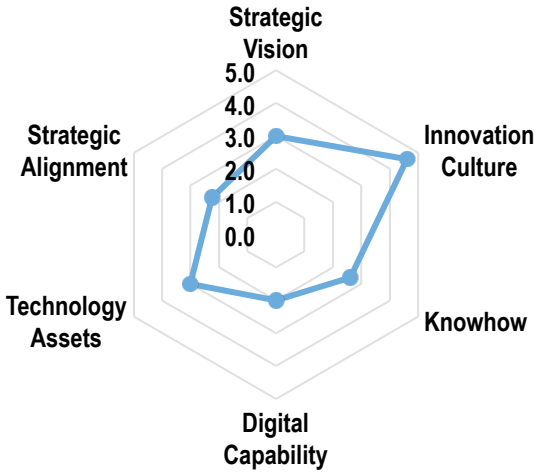

Figure 6: Pharmaceutical Company

Conclusion

Based on our research, we have created a framework for executives to assess their company's progress on six dimensions critical to successful digital transformation. The framework facilitates benchmarking one's company with others in our database - either within a sector or against companies that are in the same state of progress towards digital transformation. In addition, executives can measure their company's progress over time. Perhaps most importantly, the framework helps diagnose gaps in a company's capabilities by identifying how it performs across each of the six dimensions relative to any comparison group.

Since the imperative to exploit digital technologies will continue for the foreseeable future, the end goal isn't fixed. Rather, the state of the possible will keep advancing and the finish line will keep moving outwards. Although no approach to assess progress in digital transformation can ever be perfect given the scope of the effort, we believe our framework provides a useful means to measure a company's progress.

Recommendations

Engage with Your Peers
Digital transformation is a company-wide effort. The CIO is the ideal executive to take a leading role in transformation given her/his expertise in many of its underlying dimensions. Of course, other domain leaders must be actively engaged.

Use the Dimensions as a Checklist for Engagement
The six dimensions and the questions that comprise each dimension can serve as a checklist for a comprehensive conversation among company executives about what it is going well and what must improve to better position the company for digital transformation.

Assess Your Progress
Complete the online survey so that you can compare your business to companies that are ahead of their competitors. Use the results to examine your competitive situation and plan your next steps to move forward.

Appendix: The Benchmark Database

We collected data from one senior executive in each company surveyed. The survey questions covered general enterprise characteristics, a company's competitive context and strategy, the use of digital technologies, and the effects on performance. In addition, we asked for demographic information about the company.

A total of 147 executives responded, of which 129 were public companies and 18 were private companies. The demographic characteristics of the survey respondents are reported in Table 8.

Industrial Sector	%
Manufacturing	37.4
Wholesale/Retail Trade	10.2
Finance/Insurance	13.6
Services	32.7
Transportation/Utilities	6.1

Revenue	%
Under $50 million	10.1
$50 million - $1 billion	39.1
Over $1 billion	50.7

Employees	%
Under 1,000	39.0
1,000-9,999	32.2
10,000 and over	28.8

Date of Incorporation	%
Before 1950	16.9
1950-1980	15.5
1980-1994	19.6
1995-2005	35.8
2006 and over	12.2

Title of Respondent	%
Board Member	1.4
CEO/President	19.7
CFO	28.6
CIO/CTO	23.8
CDO	2.0
CMO	6.8
COO	14.3
Other (SVP, VP, Director)	3.4

Table 8: Sample Characteristics

About one-third of the companies are in manufacturing sectors and another one-third are in services sectors. Forty percent of the companies had 1,000 or fewer employees while one-quarter were very large companies with more than 10,000 employees. Nearly half of the companies were incorporated in 1995 or later. In comparison with the distribution of US companies, our set of respondent companies is skewed towards the larger public companies in the US.

We examined how the companies in our database perform on the six dimensions. Broadly speaking, across our database, the most common shortfalls are in a company's strategic vision and in the strategic alignment of its investments with the vision. In Figure 7, we show the scores for the dimensions at five representative percentiles: 10th, 25th, 50th, 75th, 90th. Technology assets and culture of innovation appear to be a challenge at a smaller number of companies. The best companies (top 10% in each dimension or the 90th percentile) achieve the highest scores in technology assets (4.83) and strategic vision (4.8). In contrast, the 90th percentile for knowhow and IP is much lower at 4.4, which indicates that even the best companies have more to do on this dimension. At the other end, companies in the bottom 10th percentile achieve the lowest performance on strategic vision (2.0) and strategic alignment (2.0). It's also illustrative to examine the median level, which is in the tight range of 3.2-3.67 across all dimensions, with culture of

innovation (3.8) and technology assets (3.67) scoring the highest while strategic alignment (3.2) and strategic vision (3.4) are the two lowest.

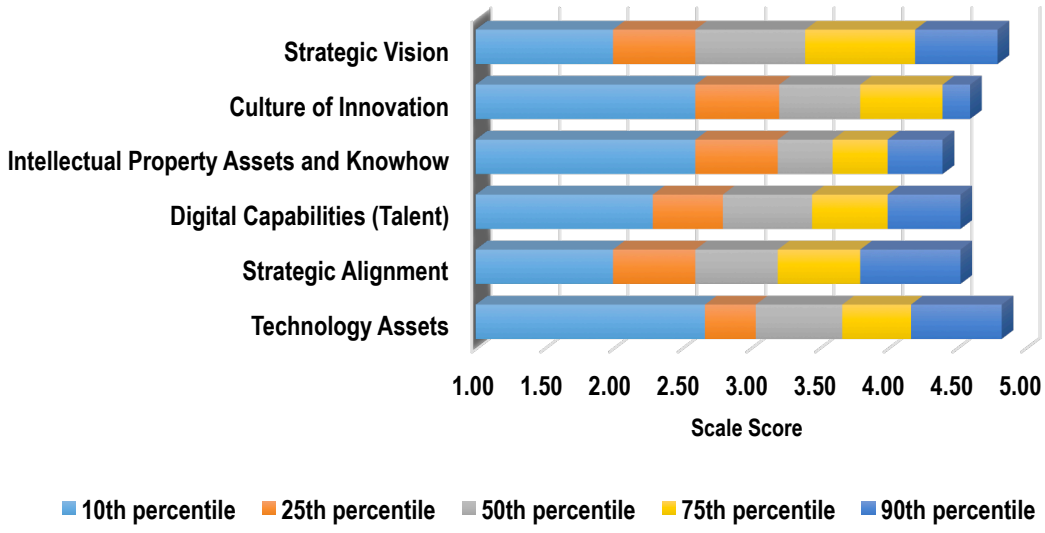

Figure 7: Percentile Distributions of Dimensions

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