

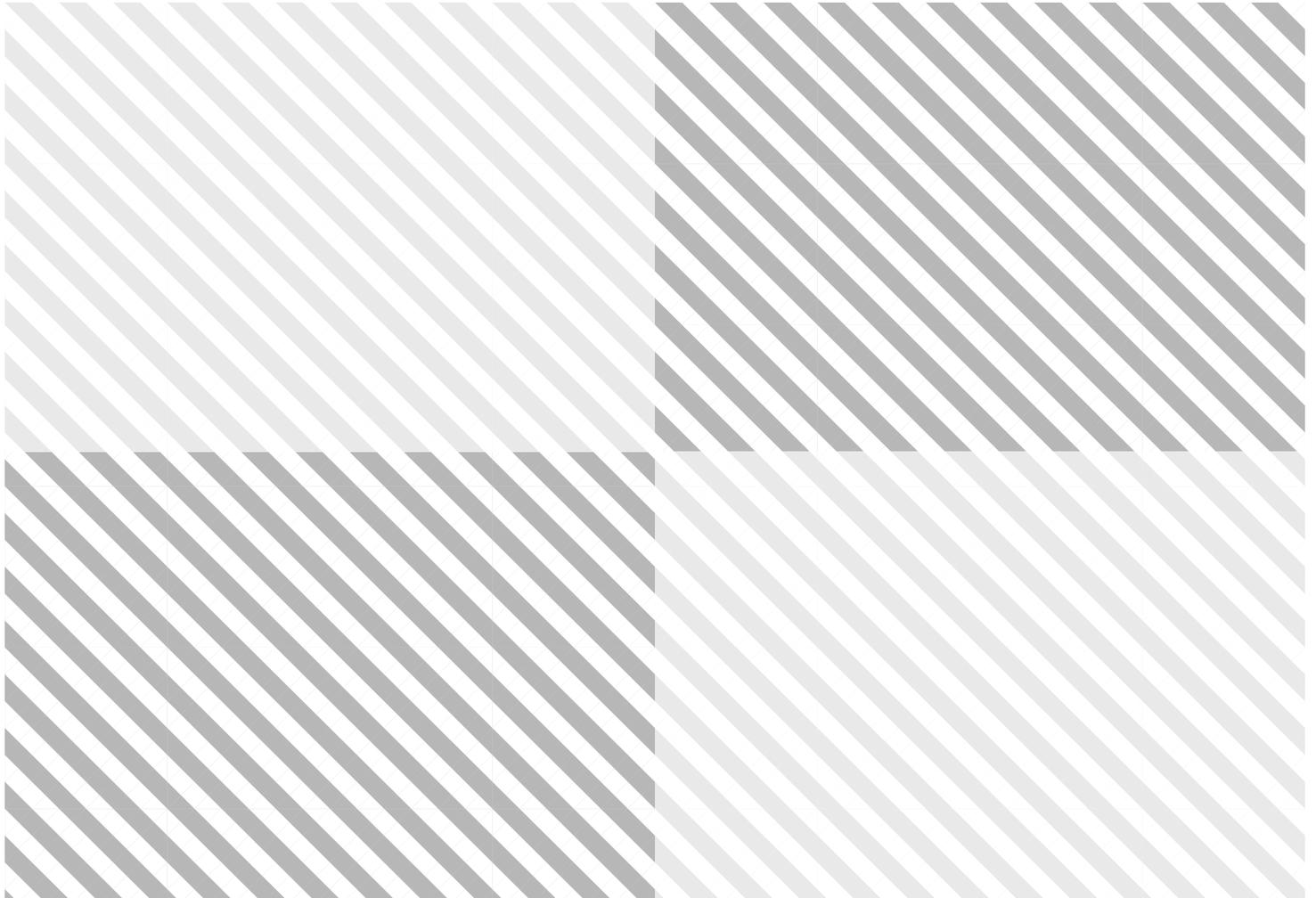
White Paper

Digital Transformation Initiative

Professional Services Industry

In collaboration with Accenture

January 2017



World Economic Forum
91-93 route de la Capite
CH-1223 Cologny/Geneva
Switzerland
Tel.: +41 (0)22 869 1212
Fax: +41 (0)22 786 2744
Email: contact@weforum.org
www.weforum.org

World Economic Forum®

© 2017 – All rights reserved.

No part of this publication may be reproduced or Transmitted in any form or by any means, including Photocopying and recording, or by any information Storage and retrieval system.

The views expressed in this White Paper are those of the author(s) and do not necessarily represent the views of the World Economic Forum or its Members and Partners. White Papers are submitted to the World Economic Forum as contributions to its insight areas and interactions, and the Forum makes the final decision on the publication of the White Paper. White Papers describe research in progress by the author(s) and are published to elicit comments and further debate.

REF 060117

The Digital Transformation Initiative

The Digital Transformation Initiative (DTI) is a project launched by the World Economic Forum in 2015 as part of the System Initiative on Shaping the Future of Digital Economy and Society. It is an ongoing initiative that serves as the focal point at the Forum for new opportunities and themes arising from latest developments in the digitalization of business and society. It supports the Forum's broader activity around the theme of the Fourth Industrial Revolution.

To find out more about the DTI project, visit
<http://reports.weforum.org/digital-transformation>

Contents

3	Foreword
4	Executive Summary
6	Industry Context and Technology Trends
6	Professional Services today
6	Digitalization in Professional Services
10	The changing economics of Professional Services
11	Future Horizons
11	Business model transformation
13	Intelligent automation
14	Digital agility
16	Talent empowerment
18	Inhibitors and Key Questions
19	Imperatives for Industry and Societal Implications
22	Glossary of Digital Technologies
25	Appendix
27	Acknowledgements
28	Contributors
29	Endnotes

Foreword

Digital transformation is emerging as a key driver of sweeping change around the world. It has the potential to significantly improve consumers' lives and create broader societal good, while providing businesses with new opportunities to capture competitive advantage and create value. The transformational power of digital is also fuelling the Fourth Industrial Revolution, changing how people live, work and relate to one another. In contrast to its predecessors, the current industrial revolution is universal, affecting every sector of the economy, including knowledge professionals.

The Digital Transformation Initiative (DTI) was launched by the World Economic Forum in 2015 to serve as the focal point for new opportunities and themes arising from the latest developments in the digitalization of business and society. The project supports the broader activity of the Forum around the theme of the Fourth Industrial Revolution.

The DTI has analysed the impact of digital transformation on six key industries – automotive, consumer goods, electricity, healthcare, logistics and media – and on three cross-industry topics: digital consumption, digital enterprise and societal implications. In 2016, the initiative was extended to cover seven additional industries, including Professional Services, and two new cross-industry themes: the platform economy, and societal value and policy imperatives. Through its broad focus, the initiative has driven engagement on some of the most pressing topics facing industries and businesses today, and provided business and policy leaders with an informed perspective on how to take action.

Digitalization is also affecting the Professional Services industry both internally and externally. How digital disrupts other industries will impact the clients of Professional Services firms, who, in turn, will have to adapt their offerings accordingly. Transforming business models to better meet client expectations, pre-empting disruptive competition, and creating the right ecosystem of partners will become a source of competitive advantage.

Professional Services companies have an unprecedented opportunity to harness the power of artificial intelligence to augment people's ability to "do", "think", "learn" and "feel". By automating routine tasks, technology is freeing people to focus on solving higher-order problems. Technology makes it more important than ever for companies to be agile – and makes it easier for them to achieve that agility. The rise in machine learning and the dominance of non-asset intensive platforms, with access to people, reach and value, will provide organizations with the tools to be ever more responsive. Companies that can anticipate change and react faster than competitors will stay ahead of the curve.

Clearly, digitalization will be a source of transformational change for Professional Services, but are we comfortable leaving machines to make ethical and moral decisions? How can the industry and government address a rising skills gap? How can we navigate the impact of automation and digital transformation on skills and people? How can we ensure that the benefits of digitalization are equitably shared?

This White Paper was prepared in collaboration with Accenture, whom we thank for their support. We also thank the members of the World Economic Forum's Professional Services Industry community and the more than 40 experts from industry partners, government and academia who were involved in shaping this project's insights and recommendations.

We are confident that if the recommended actions are implemented, we can contribute to improving the lives of people and the success of business through digital transformation. Upskilling people to be ready for changes that cannot always be predicted will be a defining challenge of our time.



Jonas Prising
Chairman and Chief Executive
Officer, ManpowerGroup



Bruce Weinelt
Head of Digital Transformation
World Economic Forum

Executive Summary

Professional Services appears to be approaching a tipping point, as disruptive technologies drive fundamental changes in the industry's economics.

Professional Services boasts a rich history and a burgeoning reputation as a growth industry and major source of employment, in both developed and emerging markets. It plays a critical role in helping its clients set their strategic direction, remain compliant, predict future risks, recruit talent, and produce and audit their financial results. The ability of its practitioners to adapt to changing demand has been important in driving growth in the Professional Services industry. This agility is in action and noticeable today, as digital disrupts other industries.

Disruption ahead?

Professional Services may be proficient at evolving its offerings to clients' changing needs, but perspectives differ on whether digital disruption has significantly transformed the industry. One school of thought sees Professional Services in the vanguard of digital transformation, with high levels of digitalization across most aspects of the sector. An alternative view holds that, despite Professional Services' outward agility, it has not yet been disrupted to the same extent as other industries.

For this White Paper, the assessment of digital disruption in Professional Services is nuanced. Though there has not yet been a seismic disruption to shake the entire industry, the shifts under the surface are stronger than many people realize. This suggests that the industry may be approaching a tipping point.

For a deeper understanding of digitalization in Professional Services, a panel of industry executives worked to assess disruption at a granular level by focusing on its impact in three areas: business model, operating model and competitive leader board. It was agreed that the industry's business model is being disrupted the most, and the leader board the least. Opinions differed about the extent of change to the sector's operating model, perhaps because of the varying degree of disruption across segments within Professional Services (with Accounting and Audit the most affected, and Big Law the least).

Digital innovation and shifting economics

Artificial intelligence (AI), data analytics, machine learning and platforms are among the most important technologies disrupting the industry. AI supports professionals to learn, think and perform better; analytics and machine learning are revolutionizing insight generation; and platforms are disrupting traditional business models by bringing buyers and suppliers together.

Digital innovation is contributing to a fundamental shift in the industry's dynamics of supply and demand. On the demand side, ubiquitous data and pervasive technology are making professions more transparent, giving clients a greater understanding of the sector and raising their expectations of receiving high-quality, professional expertise at an affordable price point. On the supply side, crowdsourcing, rapid advances in machine learning and robotic process automation, and the modularization of work are helping to create a new source of supply in Professional Services. Digital platforms offer a convenient alternative to the traditional physical marketplace for services, as clients and customers can now seek professional help online.

Digital themes

The Professional Services industry should view digitalization as an ally as it strives to provide quality expertise at scale to businesses and individuals, and further improve its operational efficiency. Four key themes are emerging:



Business model transformation.

Digitalization empowers firms to change every facet of how they go to market: their services, value propositions, target customers and price points. Firms are repositioning themselves with new services for the digital world and fostering a system of partners across the industry value chain and beyond.



Intelligent automation.

People have traditionally provided expertise, the primary offering of the Professional Services industry. However, emerging technologies such as analytics, AI and deep learning are augmenting professionals' ability to "do", "think", "learn" and "feel". This can enhance the quality and volume of expertise, and lower the cost to serve.



Digital agility.

Companies that can anticipate change, react faster than competitors, and adapt their strategies and processes in light of disruptive events are able to stay ahead of the curve. Firms are becoming more responsive by adopting a flexible workforce, promoting an agile culture and investing in smart digital infrastructure to encourage productivity and creativity.



Talent empowerment.

Reimagining the employee experience to offer the right value proposition will be imperative for firms in the digital world. They will need to leverage new technologies or models to source talent, and maintain high engagement levels by ensuring that talent is appropriately trained and dynamically managed.

Key questions

Advances in digital technology and economic shifts could revolutionize the industry, but inhibitors to change still exist. These barriers raise important questions for professionals looking to make digital transformation a reality:

- Are professionals ready to adopt technologies that may disrupt their own markets in the short term?
- Are managers at all levels of an organization ready to trust machines with their work?
- Are professionals using short- and long-term performance measures to encourage risk-taking and innovation?

Inspiring leadership for digital transformation

Strong sponsorship at the level of the board and the chief executive officer is vital if a company is to truly embrace opportunities presented by digital disruption. A digital culture is increasingly important for business growth; responsibility for nurturing that culture starts with leadership.

To help executives become effective digital leaders, a set of potential actions have been developed. These recommendations include for executives to:

- Challenge what they do today, and be bold in exploring options for dramatically changing what they do (business model) and how they do it (operating model).
- Review their priorities for automation and machine learning, and implement a pilot.
- Deploy incubator capabilities to create marketplace differentiation, by opening up to a new system of start-ups, customers, think tanks, suppliers and even competitors.
- Work collaboratively with educational institutes to identify the skills of the future and the appropriate time to invest in them.

The effects of digital innovation in Professional Services will ripple through and beyond the industry. While the net impact of digitalization is expected to be positive for society, some groups may lose out economically. Increased automation will raise difficult ethical decisions and may even reawaken the spectre of "technological unemployment". Industry, policy-makers and regulators will need to collaborate to tackle the societal challenges that may arise from the digitalization of Professional Services.

Industry Context and Technology Trends

Technological breakthroughs are contributing to shifts in the economics of Professional Services. As the industry's digitalization accelerates, the sector could be on the cusp of a transformation.

Professional Services already has a rich history – from the founding of the first guilds in the 11th century to the establishment of royal colleges for surgeons, engineers and architects in 18th-century Britain.¹ Thanks, in part, to rapid technological advances, a new chapter in that history is ready to be written, as the industry's digitalization speeds up.

a. Professional Services today

A growth sector and major employer

The modern Professional Services industry² has significant economic and social value. It is also a fast-growing source of employment in both developed and emerging markets. The surge in the variety of occupations and the number of individuals classified as "technical or professional" may be correlated with the rapid evolution of technology in the late 20th century.³ Professional and business services is now estimated to be the second-largest employment sector in the United States (after healthcare), and is expected to grow to approximately 21 million jobs by 2024.⁴ Professional Services account for 15% of the United Kingdom's gross domestic product (GDP) and employ 14% of its workforce,⁵ while the service sector's share of India's GDP increased from 33% in 1951 to 57% in 2015.⁶

>\$120 billion

Annual combined revenue of the Big Four accounting firms

<\$120 billion

Individual GDPs of two-thirds of the world's countries^{7,8}

A critical link in every industry's value chain

The Professional Services industry helps its clients set their strategic direction, remain compliant, predict future risks, recruit talent, and produce and audit their financial results. The value of professionals in the eyes of corporations is reflected by the trend of insourcing professionals.⁹ A 2015 survey of more than 250 chief legal officers found that 40% of companies planned to decrease their spending on outside counsel over the following year, with the majority planning to insource the work instead.¹⁰

Agile and quick to adapt to clients' changing needs

The ability of its practitioners to adjust to changing demand has been important in driving growth in Professional Services. In segment after segment, strong companies have been adapting by attracting the right talent and developing new value propositions. As digital technologies disrupt industries, this agility is in action again, today.

Professional Services companies are refashioning their services to help clients innovate and embrace change in the digital marketplace. Consulting firms are transitioning to more transformational work, helping clients execute their vision through short-term, iterative steps. Human capital firms are changing the way they map and source talent. In addition, legal firms are thinking about the risks associated with digitalization for their clients, and Professional Services multinationals are considering how to quantify the financial impact of digital transformation.

b. Digitalization in Professional Services

Professional Services: Already a digital leader?

Professional Services may be proficient at adapting to its clients' changing needs, but perspectives differ on the extent of digitalization in the sector and whether the industry as a whole has been disrupted.

From a market-facing perspective, Professional Services is in the vanguard of digital transformation, with high levels of digitalization across most of the sector. The 2015 edition of the McKinsey Global Institute's Industry Digitization Index rates Professional Services as a relatively highly digitized industry, with only Information and Communications Technology, as well as Media, seen as more advanced in this respect.

In contrast, when viewing the industry leader board, one can conclude that Professional Services has not been disrupted as much as industries such as Media, Telecommunications or Retail, despite the sector's external focus and connections with other industries. Supporting this perspective is a 2016 survey by Russell Reynolds Associates of 2,000 highest-level executives on the impact of digital technologies across 15 industries: only half of the Professional Services executives interviewed saw major change ahead.¹¹

Disruption ahead?

For this White Paper, the assessment of digital disruption in Professional Services is nuanced. At the turn of the century, the industry embraced the challenges and opportunities of

the outsourcing wave, leading to increased efficiency and new ways of providing services. New firms started to climb the industry leader board, including some from emerging markets with global ambitions. However, as digitalization accelerates today, a similarly seismic disruption has not yet shaken the entire industry:

- The impact will vary by segment; for example, audit is seeing a significantly greater impact than, say, legal (see Figure 1).
- The impact is greater on business models but, unlike the wave of outsourcing, significant shifts in market share from incumbents to disruptive innovators have not taken place. This is particularly true in segments where firms serve large clients. As one chief executive officer (CEO) stated, “There is only one GE, and to help it solve its unique issues requires talent, insight and a unique, differentiated approach.”
- The strengthening market position of major players through consolidation in certain segments of Professional Services offers further evidence that disruption's impact has so far been relatively limited.

36.3%

Market share of top 10 players in consulting in 2011¹²

53.4%

Market share of top 10 players in consulting in 2015¹³

Certain characteristics of Professional Services may have shielded the industry as a whole from wholesale disruption. These include:

- Professional Services firms serve large clients by solving their unique problems with customized solutions. Using digitalization to run analytics or to predict trends may be too narrow or simplistic to solve a client's problem.
- In an industry where client confidentiality is key, trust in a brand is the foundation for providing expertise. A board finds it easier to accept a business plan backed by a top strategy company, or a merger-and-acquisitions deal vetted by a respected law firm. Professional Services companies benefit from brands established over decades of close client relationships.
- Certain segments of Professional Services firms tend to be quite regulated due to the sensitive nature of their work (e.g. law and audit), although this may be changing in certain markets.

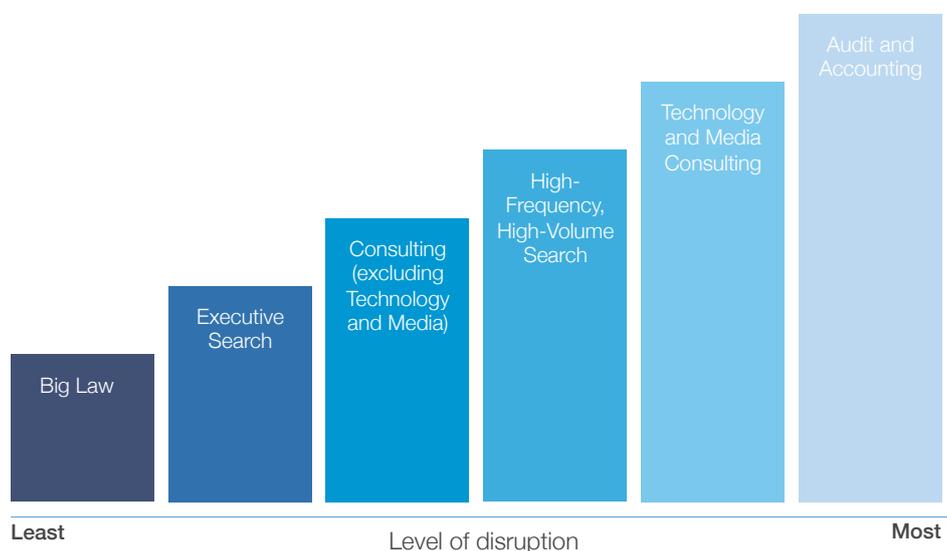
Disruption is happening, but only in certain areas

Viewed from a high level, the industry does appear to have escaped massive disruption, but the research for this White Paper has highlighted that certain areas within Professional Services do lend themselves to disruption. Leading firms are already driving disruption in many areas of their business. The industry executives interviewed for this White Paper agreed that digital transformation is now at the tipping point, and are expecting it to have an increasing and accelerated impact on the industry.

Impact of technology by industry segment

The extent to which digital technologies are disrupting Professional Services varies across segments. The impact of digital technologies was explored and assessed by working with a panel of industry executives and using three lenses: business model, operating model and competitive leader board. The conclusion reached was that technology has disrupted Accounting and Audit the most, and Big Law the least.

Figure 1: Impact of Technology by Industry Segment



Source: World Economic Forum/Accenture analysis

Accounting and Audit: This profession is believed to be most at risk from computerization and technology. A PwC research report ranked professions by the likelihood of their being automated in the next 20 years. With a 97.5% probability, accounting came on top.¹⁴ The business and operating models for this segment are also expected to shift significantly, as 24/7 automated solutions become increasingly prevalent.

Consulting: It has been predicted that cognitive AI could replace 30% of consulting resources by 2017.¹⁵ However, consulting spans a broad spectrum, with levels of disruption varying in different areas. Technology and media consulting appears to be experiencing disruption more than other areas. Higher-end services involving highly customized solutions are expected to be less disrupted than those based on more repetitive analysis.

Executive Search: Technologies such as machine learning and digital platforms are changing the way executive search companies source, assess and match talent. For example, firms such as Gild and Entelo analyse vast amounts of data from CVs and social media profiles to automate certain recruiting tasks. The competitive environment is evolving rapidly; companies that are currently clients could soon become competitors.

Big Law: Strict regulations have traditionally shielded the legal sector from disruption. However, a recent study by Deloitte found that lower-skilled jobs, such as legal secretaries and paralegals, could be cut by 39% over the next two decades.^{16,17} Data science is enabling law firms to exploit large volumes of existing data to create value for their business.¹⁸

Advances in technology are opening the industry up to disruption

Several technologies have been identified as being critical to driving disruption. Analysis of these technologies points to the possibility of greater disruption ahead. The combination of these technologies further reinforces the view that the industry is approaching a tipping point.

Important disruptive technologies include the following:

- **Artificial intelligence** can boost productivity levels by helping people learn, think, feel and perform better.

- **Data, analytics and machine learning** can revolutionize insight generation.
- **Platforms** can disrupt and disintermediate traditional business models by bringing buyers and suppliers together.

The impact of each technology (see Figure 2) and the time for it to be widely adopted varies. Many technologies are still nascent and will need to go through an innovation cycle before they can be successfully brought to market.

The technologies transforming Professional Services^a

Innovations such as machine learning, natural language processing, blockchain, deep learning and talent science could have a transformational impact on many segments of the Professional Services industry within the next decade. These technologies have considerable potential to boost efficiency and security, cut costs or generate new revenues.

Virtual reality, video recruiting and augmented reality applications are among the technologies more likely to provide incremental improvements to established processes over the same time frame. Similarly, more nascent innovations (e.g. augmenting the human body to improve cognitive and physical performance beyond normal human limits) are unlikely to be widely adopted and to precipitate the wholesale replacement of human workers in Professional Services during the next decade.¹⁹

The impact of different technologies on Professional Services varies by industry segment, as Figure 2 illustrates.

Figure 2: Disruptive Impact of Digital Technologies on Professional Services, by Segment

	Legal	Consulting	Auditing & Accounting	Human Capital
Machine Learning	Impacted by technology	Impacted by technology	Impacted by technology	Impacted by technology
Deep Learning	Impacted by technology	Impacted by technology	Impacted by technology	Impacted by technology
Data Science	Impacted by technology	Impacted by technology	Impacted by technology	Impacted by technology
Smart Robots	Impacted by technology	Impacted by technology	Impacted by technology	Impacted by technology
Natural Language Processing	Impacted by technology	Impacted by technology	Impacted by technology	Partially impacted by technology
Virtual Reality	Partially impacted by technology			
3D Video Telepresence	Partially impacted by technology	Partially impacted by technology	Partially impacted by technology	Impacted by technology
Blockchain / Distributed Ledgers	Impacted by technology	Partially impacted by technology	Impacted by technology	
E-Discovery Software	Impacted by technology			

^a This analysis of technologies is illustrative and non-exhaustive. A glossary of the technologies appears at the end of this White Paper.
Source: World Economic Forum/Accenture analysis

Some of these technologies are already making an impact in Professional Services. Digital trends indicate that technology is slowly levelling the playing field: automation is lowering the cost to serve, global collaboration tools are allowing freelancers to work from anywhere, and platforms are bringing clients closer to freelancers. These developments, coupled with data ubiquity, are empowering the client, marking a shift in the way expertise will be procured and shared in the future.

Disruptors are finding new ways to establish a trusted brand, as illustrated by the Kaggle case study. Online reputation systems (e.g. Avvo) are emerging for lawyers, allowing clients to rate lawyers based on their skill and pricing.²⁰ Apps are helping professionals to better understand personality types and build stronger client relationships. Advances in technology are even expected to help robots develop some emotional intelligence in the future.

Case Study: Kaggle – Building Trust and a Brand through Crowdsourcing

Kaggle, a platform for data science, hosts competitions in which statisticians and data miners from around the world compete to produce the best models for solving data-based problems posted by companies and researchers. The top-three data scientists get financial rewards, and Kaggle charges the client a flat fee for checking the quality of the work. As countless strategies can be applied to any predictive modelling task, this crowdsourcing approach relies on not knowing at the outset which technique or analyst will be most effective. Kaggle also hosts recruiting competitions, in which data scientists compete for a chance to interview at leading data science companies (e.g. Facebook or Walmart). In a sense, Kaggle has also crowdsourced its own brand, as its reputation rests on the quality of the data scientists participating in its competitions.

c. The changing economics of Professional Services

Digital disruption is contributing to a fundamental shift in the dynamics of the supply of and demand for Professional Services. The industry's economics are changing in three key ways:

1. An evolving demand landscape

“As both the definition of data and its availability become ever more dynamic, analysis can no longer be static in spreadsheets. The client now wants to know everything in real time.”

John Romeo, Managing Partner, North America, Oliver Wyman Group

Ubiquitous data and pervasive technology give clients greater insight into how professions work. Legal texts are now available online for anyone to read. More than 91% of

US tax returns were filed online in 2015.²¹ LinkedIn has enabled clients to vet proposed consultants before procuring services. Availability of and access to this data has allowed clients to have more say in how they procure expertise. Insourcing of professionals has also injected more transparency into their work by reducing the degree of separation between them and their clients. This has created an expectation of high-quality professional expertise at an affordable price point.

2. New dynamics of supply

Traditionally, the Professional Services industry has relied on human skills to meet clients' needs. Machines are now acquiring expertise based on cognition and memory, which was once solely a human capability. Rapid advances in machine learning and robotic process automation (RPA) are helping to create a new source of supply in the Professional Services market.

Case Study: Baker & Hostetler – Ross, the Artificially Intelligent Lawyer

The law firm of Baker & Hostetler recently employed its first artificially intelligent lawyer, Ross, built on Watson, IBM's cognitive computing platform. Hired for Baker & Hostetler's bankruptcy practice, where 50 human lawyers currently work, Ross is designed to read and understand language, postulate hypotheses when questioned, research, and then generate responses (along with references and citations) to back up its conclusions. Learning from experience, Ross gains speed and knowledge the more lawyers interact with it. The AI-powered lawyer also constantly monitors current litigation so it can notify colleagues about recent court decisions that may affect their cases. Other firms have also signed licences with Ross.²²

114,000

Number of legal-sector jobs likely to be automated in the next 20 years²³

Digital innovations are improving workplace productivity, which is expected to rise by 22% by 2020,²⁴ and reducing the amount of labour needed to complete a job (by 4% per year in consulting to 2019).²⁵ Technology is supporting increasingly effective remote collaboration, boosting productivity and enabling a shift towards freelance work.

43%

Proportion of US workforce expected to be freelance by 2020²⁶

Professional Services firms must also confront a new source of competition emerging from other industries. Clients of Professional Services companies now have access to unprecedented amounts of data, enabling them to move from selling products to selling outcomes. As a result, they are now encroaching on the territory traditionally occupied by consulting firms. An example is GE's Predix platform, used by industrial companies to generate insights from vast troves of operational data.

3. Alternative marketplaces

Online platforms now offer a convenient alternative to the traditional physical marketplace for services. Clients and customers can seek professional help from anywhere and at any time. Upwork is a platform connecting 5 million client businesses with more than 12 million freelancers. In the legal profession, virtual courtrooms are replacing the need for physical ones, as lawyers, witnesses and judges can now hold hearings via video link.²⁷ Buttressing this trend are the 3 billion people who now have internet access and the 2 billion using smartphones, both of which are accelerating the change in how services are bought and sold.

These dramatic shifts in the dynamics of supply and demand are creating a need for Professional Services firms to analyse every aspect of their own businesses – in much the same way they would assess a client's – if they are to seize the opportunities provided by digital transformation.

Future Horizons

“It took 65 years to grow Baker & McKenzie and our comprehensive global footprint. Today smaller firms can connect with each other and potentially achieve scale much faster; the challenge for them will be to become a truly integrated global firm.”

Erik T. H. Scheer, Partner and Member of the Executive Committee, Baker & McKenzie

The Professional Services industry should view digitalization as an ally as it strives to provide quality expertise at scale to businesses and individuals, and further improve its operational efficiency.

Four themes will likely have the greatest impact in the digital transformation of Professional Services over the next decade:



Business model transformation. Digitalization empowers firms to change every facet of how they go to market: their services, value propositions, target customers and price points. Firms are repositioning themselves with new

services for the digital world and fostering a system of partners across the industry value chain and beyond.



Intelligent automation. Expertise, the primary offering of the Professional Services industry, has traditionally been provided by people. However, emerging technologies such as analytics, AI and deep learning are augmenting

professionals' ability to "do", "think", "learn" and "feel". This can enhance the quality and volume of expertise, and lower the cost to serve.



Digital agility. Companies that can anticipate change, react faster than competitors, and adapt their strategies and processes in light of disruptive events are able to stay ahead of the curve. Firms are becoming more responsive by

adopting a flexible workforce, promoting an agile culture and investing in smart digital infrastructure to encourage productivity and creativity.



Talent empowerment. Reimagining the employee experience to offer the right value proposition will be imperative for firms in the digital world. They will need to leverage new technologies or models to source talent, and

maintain high engagement levels by ensuring that talent is appropriately trained and dynamically managed.

These themes encompass both opportunities for and threats to the existing businesses of Professional Services firms. Within each theme, firms can implement concrete initiatives to accelerate their transformation and fully realize their digital potential.

a. Business model transformation

Firms are repositioning themselves for the digital world, taking new data-based offerings to clients and fostering an ecosystem of partners across the industry value chain and beyond.

Digitalization offers Professional Services companies an opportunity to fundamentally transform how their business turns a profit. They can enhance their go-to-market strategy by creating digital and data-rich solutions, and spur innovation by collaborating within a system of partners. The research for this White Paper indicates that these more decisive companies will continue to gain momentum.

“New digital business models are the principal reason why just over half of the names of companies on the Fortune 500 have disappeared since the year 2000. And yet, we are only at the beginning of what the World Economic Forum calls the ‘Fourth Industrial Revolution’, characterized not only by mass adoption of digital technologies but by innovations in everything from energy to biosciences.”

Pierre Nanterme, Chairman and Chief Executive Officer, Accenture

Enhancing the go-to-market strategy

Professional Services firms are evolving their offerings to keep pace with digitalization, building digital platforms to facilitate conversations with clients. New data is generating novel insights to solve specific client needs. Firms are partnering with clients to offer dynamic, subscription-based solutions rather than static spreadsheets. Major ways in which companies are transforming their client-facing business include:

- **Providing offers for the digital age.** Firms are supplying relevant digital services – for example, by using digital as an integrated growth platform to position themselves as one-stop shops for all digital needs.

Case Study: BCG Digital Ventures – Creating Disruptive Digital Businesses

The Boston Consulting Group launched BCG Digital Ventures in 2014 as a corporate investment and venture development firm. Its focus is building, incubating and scaling disruptive digital businesses. It helps invent, build and launch category-changing businesses at start-up speed for the world's largest corporations, enabling them to reinvent themselves. The firm shares risk and invests alongside its clients.

- **Developing data-based services.** Systemic presence and data capture are making data ubiquitous. Big-data analytics and brute-force analysis are spotting trends and generating insights like never before, at fractional cost. Professional Services firms are using this to strengthen their existing services, or to offer new ones.

Case Study: Lex Machina – Mining Litigation Data for New Insights

Lex Machina mines litigation data, revealing previously unavailable insights about judges, lawyers, parties and patents, culled from millions of pages of intellectual property (IP) litigation. Corporate counsel use Lex Machina to select and manage outside counsel, increase IP value and income, protect company assets and compare performance with competitors. Law-firm attorneys and their staff use Lex Machina to pitch and land new clients, win IP lawsuits, close transactions and prosecute new patents. Prominent clients include eBay, Microsoft and Shire Pharmaceuticals. The company claims that the total number of patent litigation cases filed has increased by more than 100% in the past three years.

- **Adjusting revenue models.** Professional Services firms (in particular, consulting, law and accounting firms) have traditionally followed capacity-leasing models, hiring out their resources to clients for a fixed period of time at an hourly rate. With clients now demanding dynamic support, a shift has occurred towards outcome- or subscription-based models that provide them with real-time solutions. Bloomberg and Capital IQ are examples of companies providing these new solutions.

As the speed of digitalization increases, Professional Services firms are becoming partners to clients, helping them to imagine the future and execute that vision. Thus, outcome-based pricing, which is typically associated with partnerships and joint ventures, has become common.

“Going forward, a greater percentage of work will be sold through subscriptions and licences, rather than hourly charge-out rates. At the moment, this trend is in its initial stages, but the legal sector is capable of developing it further.”

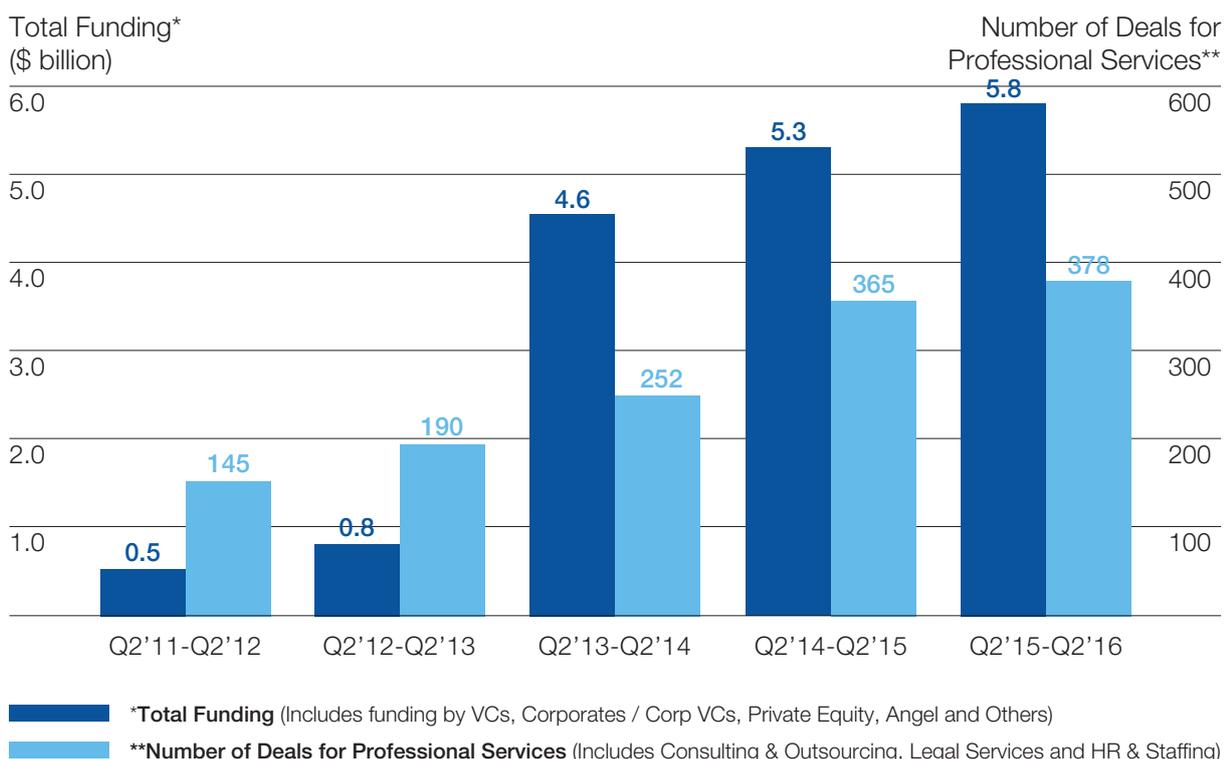
Bas Boris Visser, Global Head, Innovation and Business Change, Clifford Chance

Fostering a digital environment

Traditionally, enterprises have owned their end-to-end services and related functions. Recently, however, a shift has occurred towards cultivating systems of partnerships between incumbents and start-ups. This change has fostered innovation, promoted specialization and made operations more agile. It has also helped companies create new and innovative value propositions for clients at lower price points.

Over the past five years, the worldwide value of venture-capital and private-equity funding worldwide in Professional Services has increased more than tenfold, and the number of such deals has jumped by 140% (see Figure 3). These figures indicate an acceleration in disruptor and start-up activity within the industry.

Figure 3: Total Funding and Number of Deals in the Professional Services Industry Worldwide



Source: CB Insights

Case Study: KPMG and IBM – Deploying Cognitive Technology to Enhance Professional Services

KPMG has partnered with IBM to use its Watson cognitive computing platform to enhance its Professional Services offerings, particularly in audit and assurance services. Cognitive technology can analyse a larger percentage of available data, giving KPMG professionals deeper insights into a client's financial and business operations. Cognitive-enabled processes also allow auditors to focus on higher-value activities, such as offering additional insights relating to risk. The partnership is expected to help KPMG develop new offerings and meet its extensive audit-specific security, confidentiality and compliance requirements.²⁸

“The world is complex, so Professional Services firms can't do everything on their own. They need an ecosystem of partners outside.”

Eric Gervet, Partner, A.T. Kearney

Case Study: Accenture's Open Innovation Platform – Helping to Bring Innovative Start-Ups to Market

Accenture's Open Innovation Platform works with top-tier accelerators, start-ups, venture capitalists, universities and corporate research and development labs to build and bring innovative solutions to market.²⁹ By bridging the gap between clients and the start-up community, Accenture helps clients meet their business-transformation objectives. Accenture also connects its partners with pioneering clients to create compelling growth opportunities. This system for innovation is a source of ideas that can help fuel an enterprise's research agenda, identify trends that shape strategy and roadmaps, develop new products and solutions, and explore new markets. In each case, Accenture serves as a vital facilitator between the players.

b. Intelligent automation

Emerging technologies such as analytics, AI and deep learning are augmenting professionals' abilities to do, think, learn and feel.

Intelligent automation uses technology to perform highly repeatable tasks that previously required human time and effort. By modularizing work (breaking down the "job" into discrete tasks), and then either crowdsourcing or investing in the right technology to perform those readily automatable tasks, companies can decrease the cost and time to serve while increasing accuracy.

Modularizing work

Modularizing work breaks down Professional Services projects so that professional expertise can be matched precisely to customers' needs, thus lowering the cost to serve. Super-specialized new entrants are unbundling specific tasks from larger projects and, as their expertise in modularizing work deepens, are moving up the industry value chain to tackle increasingly complex projects.

Law is also affected, as modularizing work allows firms to break down briefs into discrete tasks, such as due diligence, document review, legal research, document assembly and routine contract drafting. This permits pieces of work to be automated, crowdsourced, outsourced, subcontracted or performed by paralegals.

Case Study: LeClair Ryan – Unbundling Litigation Work to Lower Costs

LeClair Ryan, a law firm, launched its Discovery Solutions Practice to serve lower-margin work. Clients can unbundle litigation work and "right-source" certain tasks to the firm at a dramatically lower cost. LeClair Ryan coordinates this work with its higher-value service of lead counsel, which focuses on more complex aspects of litigation.

Consultancies are also modularizing work by separating tasks such as knowledge capture, research, content creation and data analysis. Experts are now being tapped using digital-only platforms such as 10 EQS or the Corporate Executive Board. Several consulting firms have offshored parts of their research work to centres in developing markets. At the same time, consulting firms' expertise in data analysis is being unbundled into a range of off-the-shelf software and tools for their clients. Deloitte's offerings have been unbundled to include a range of nine products within Deloitte Managed Analytics, and McKinsey Solutions offers 16 unbundled products.³⁰

Case Study: McKinsey Solutions – Servicing Clients with Software- and Technology-Based Analytics

McKinsey Solutions has unbundled its offerings to provide software- and technology-based analytics that can be embedded in a client's business. The services include pricing and promotion tools to improve the return on sales, organizational health indices and benchmarking solutions.

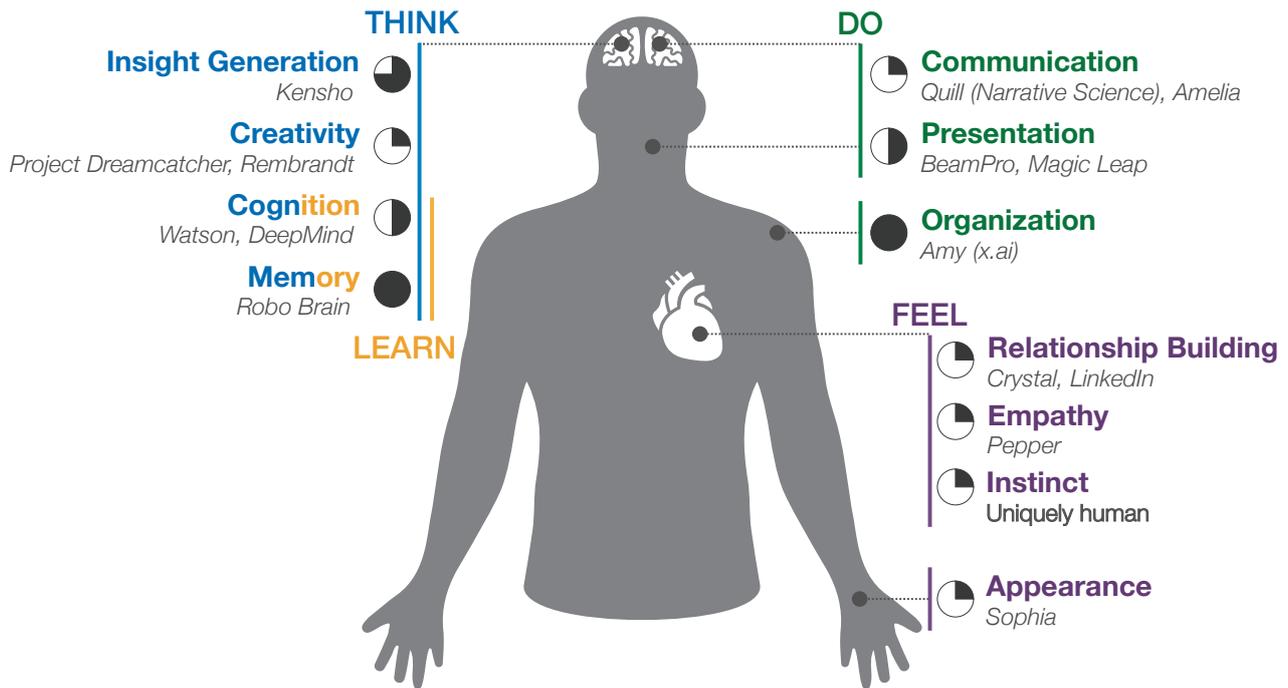
Augmenting human intelligence

As the primary output delivered by the Professional Services industry, expertise has historically been provided by people. However, machines are augmenting key human capabilities so that expertise can be provided to clients more efficiently, using a combination of people and machines. This will enhance the quality and volume of expertise provided, while lowering the cost to serve.

When examining which human capabilities are most important for professionals to provide expertise, the degree to which each of these is augmented by technology was also investigated. In addition, the analysis included the views of a panel of industry executives. The results are summarized in Figure 4.

Most of the executives interviewed agreed that emerging technologies will augment professionals' capability to do (RPA, blockchain), think (AI), learn (machine learning) and, eventually, feel (deep learning, social networks). However, "feel" is expected to remain a uniquely human capability in the near future and will continue to give people a competitive advantage over machines in the next decade.

Figure 4: Emerging Technologies Can Augment Professionals' Ability to Provide Expertise



Note: The degree to which technology is augmenting human capabilities is indicated by the ideograms next to each capability. Definitions of the human capabilities represented can be found in the appendix, along with details of those case studies not included in the main body of the White Paper. Source: World Economic Forum/Accenture analysis

The distinctly human abilities of discernment, abstract thinking and contextual reasoning are maximized when automation frees up time for people to focus on the judgement-rich work machines cannot do. For example, in the legal profession, due diligence, corporate services and stand-up contracts are open to automation, but boardroom counselling, corporate advice and tax advice less so. In accounting, increased automation could lead to changes in existing roles (e.g. accounts-payable clerks could focus more on exceptions rather than routine scenarios) and the emergence of new careers (e.g. data scientists, scenario planners and market makers).

Case Study: Kensho – Using Big Data and Machine Learning to Answer Complex Research Queries

Kensho augments human capabilities to think, learn and do by combining big data and machine learning to analyse the impact of real-world events on financial markets and answer complex financial queries automatically. In the past, a trader or analyst had to conduct research by accessing multiple databases using certain keywords. Kensho's search engine automatically categorizes events according to abstract features, a process that takes just a few minutes. Generating a similar query without automation could take about 40 man-hours, a significant investment for companies whose employees are paid an average salary of \$350,000 to \$500,000. Goldman Sachs is Kensho's largest investor and uses it to perform research work. JPMorgan Chase and Bank of America have also recently signed up with Kensho.³¹

Case Study: x.ai – Harnessing Artificial Intelligence to Schedule Meetings

Start-up x.ai has created "Amy Ingram", an AI-powered personal assistant for scheduling meetings. Users wishing to set up a meeting are encouraged to communicate with Amy as though she were human, by copying her on emails. She then manages the back-and-forth communication to set up the meeting by looking for a mutually convenient time in everyone's calendar.³² According to its CEO, x.ai's addressable market is 87 million US-based knowledge workers, who need to arrange more than 10 billion meetings each year.³³ Today, the product is free, and the plan is to keep a free tier in place, as paid tiers are added. The free tier will likely limit the number of meetings a user can arrange. The start-up initially raised \$9.2 million at a \$40-million valuation in January 2015,³⁴ then an additional \$23 million in April 2016, which valued the company at approximately \$100 million.³⁵

c. Digital agility

Companies with workforce flexibility, an agile work culture and smart infrastructure can anticipate change, react faster than competitors, and adapt their strategies and processes in response to disruptive events.

“The competition that kills you won't look like you.”

Richard Susskind, Advisory Board Member and Visiting Professor, Oxford Internet Institute, University of Oxford

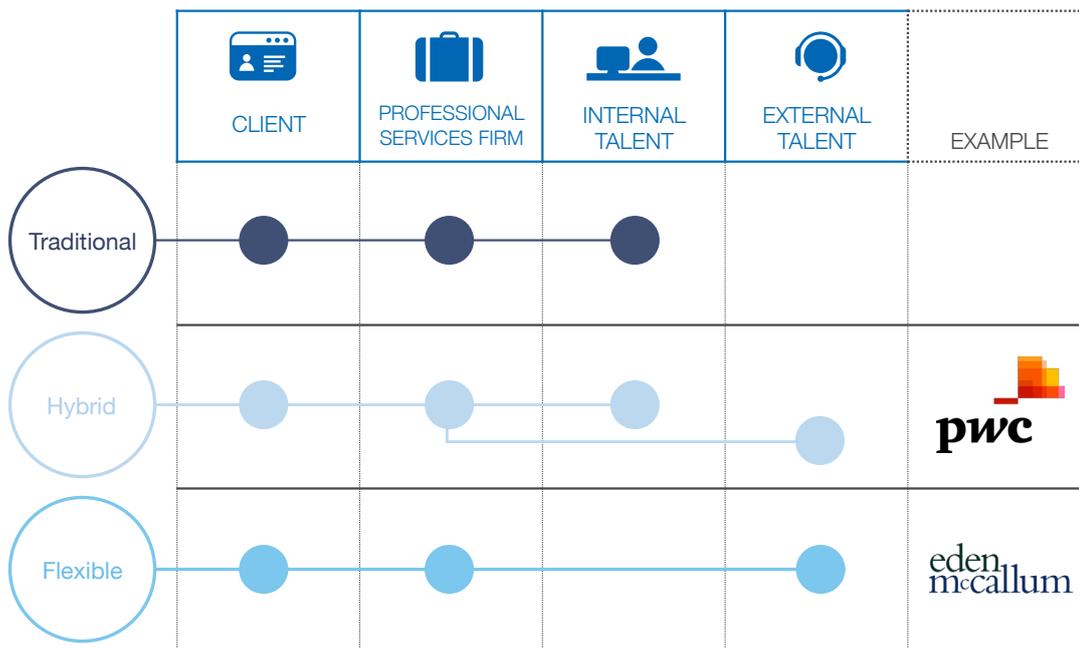
With disruptive events often shifting the industry landscape unexpectedly, adaptability and agility have emerged as distinguishing characteristics of high-performing businesses. This theme highlights the tools that organizations and their workforces need to react nimbly to the digital economy's unrelenting pace of change.

Developing a flexible workforce

Platforms enable organizations to flex their workforces, manage capacity effectively and crowdsource super-specialists for specific tasks. The result is an operating model with greater agility.³⁶

Figure 5 illustrates three models for organizing a workforce: traditional (fixed), flexible or hybrid. In a traditional labour model, a client engages a Professional Services firm, which then allocates internal resources to serve the client. In a flexible model, the Professional Services firm has no talent on its books, but crowdsources on-demand workers for specific projects. A third model is also emerging, as a hybrid of the first two: when the Professional Services firm is engaged, it decides which tasks it prefers to do in-house and which could be best allocated to freelancers via on-demand platforms.

Figure 5: Three Models for Organizing a Workforce



Source: World Economic Forum/Accenture analysis

Case Study: Eden McCallum – Using Freelance Consultants to Build Lean Project Teams

The consulting firm Eden McCallum assembles leaner project teams of freelance consultants (mostly mid-level and senior alumni of top consultancies) for clients at a lower cost than traditional competitors. It achieves this economy because freelance teams do not carry the fixed costs of unstaffed time, expensive downtown real estate, recruitment and training.

Case Study: PwC – Creating a Marketplace for Freelancers

PwC has a marketplace for freelance workers on its Talent Exchange platform. Launched in 2016, the platform is geared towards the firm's consulting business, allowing PwC to staff projects using freelancers on an on-demand basis. It is projected that freelancers will eventually make up 10% of the firm's US consulting workforce, which currently stands at 13,000.

Nurturing an agile culture

“Historically, we drove change by transforming people, process or technology. In a digital world, the interplay between these three dimensions is more dynamic – and the pace of change considerably more accelerated. Those who embrace change and adapt quickly will be rewarded.”

Mark Goodburn, Chairman, Global Advisory Services, KPMG

Agility is a cornerstone of successful digital transformation. High-performing companies can rapidly reconfigure their offerings to meet client needs. A nimble mindset across a Professional Services firm's talent pool helps the company rapidly identify new markets and deploy tailored solutions. Internal agility also empowers businesses to quickly fix mistakes and learn from them.

As companies look for greater agility and employees seek more flexibility, a nimble organizational culture can create a win-win for the company and its employees. Nurturing an organizational culture with the following attributes can help both the organization and the individual employee to thrive:

- 1. Encourage a healthy attitude towards risk.** A higher tolerance of failure can spur innovation. Professional standards and internal policies are important, but should not be seen as an immovable barrier to change.
- 2. Mobilize employee intelligence.** Dynamic role descriptions and distributed authority can unlock creativity in the workforce. A shift away from centralized planning and control towards distributed decision-making in real time accelerates the pace at which an organization can operate.³⁸
- 3. Facilitate collaboration.** The cross-fertilization and blossoming of creative ideas is encouraged by employees joining overlapping communities within a company. Instilling a belief with both the enterprise and its employees that collaboration is less about owning and more about sharing benefits can lead to better communication, trust and knowledge distribution.³⁹

A digital culture is increasingly important for business growth. Responsibility for nurturing that digital culture starts with leadership. Business leaders with digital credentials can help an organization digitally transform on both the inside (operations, culture, practices and workforce) and the outside (company image and appeal to prospective employees).

Investing in smart infrastructure

Using digitally enabled infrastructure enhances internal productivity and creativity, and improves the employee and client experience a firm offers.

Innovative project-management tools offer convenient alternatives to clunky software for organizing work, and smart vision systems facilitate social analysis and relationship building. Microsoft's vision of the future computer – a machine that tracks hand motions with high precision – could remove the need for a mouse and keyboard.⁴⁰ The IBM-Cisco partnership opens up the possibility of integrating IBM's email platform with Cisco's messaging products, enhancing employee productivity by making routine tasks simpler (e.g. setting up meetings).⁴¹ Tangible user interfaces could make workspaces more interactive. The vision of Google's Daydream Labs – letting users tell stories in virtual reality (VR) through 3D-animation techniques – could transform how professionals such as designers and consultants present their work.⁴²

Enterprises that empower workers at all levels with the appropriate digital tools and infrastructure can steer their employees towards sounder business decision-making, greater efficiency and enhanced creativity.

Case Study: Crystal – Helping Professionals Connect and Communicate

Crystal helps workers build productive relationships by understanding the personalities of people they communicate with. It offers instant access to millions of personality profiles

and free communication advice. As work communications move away from in-person meetings around a conference table towards virtual chatrooms, misunderstandings are more likely to occur. The app steps in to coach individuals on empathy and assist non-native English speakers. Sales executives from over 75% of Fortune 500 companies use Crystal. For prices ranging from \$19 to \$49 a month, the Crystal Gmail plugin offers real-time editing suggestions to tailor an email to the recipient's personality. It analyses publicly available data sources to categorize professionals into 64 personality types, then extrapolates from this to identify their communication style.

Augmented reality (AR) could transform how employees and clients collaborate around the globe. With about 40% of workers expected to freelance in the future,⁴³ working environments will need to be a seamless blend of the virtual and the real. Tools such as videoconferencing and live chat that enable immersive, face-to-face interactions will be invaluable.

d. Talent empowerment

In a digitalized world, reimagining what it means to be an employee and remodelling the value proposition for employees accordingly will be imperative.

This theme highlights the importance of ensuring talent is hired with greater precision, and is appropriately trained and dynamically managed so that employees can reach their potential.

Reimagining hiring

How should firms recruit, and whom? How many people should they recruit? As digital technologies transform the Professional Services industry, the answers to these questions are evolving.

Recruiters and candidates already have tools to make hiring more efficient. Hiring coaches help candidates manage their profiles across various platforms, including LinkedIn and Glassdoor, which have fostered new, direct interactions between recruiters and candidates. These trends will only strengthen with time. AI is also set to play a leading role, enabling recruiters to scan thousands of CVs and shortlist candidates more efficiently.⁴⁴

Case Study: Entelo – Using Big-Data Analytics for Recruitment

Entelo leverages big data, predictive analytics and social signals to help recruiting organizations find, qualify and engage with talent. Diversity features, which are used by about half of customers, allow companies to target specific genders or ethnicities. Entelo's clients are mostly small, fast-growing technology companies paying either \$500 a month or \$5,000 a year to run targeted searches of its databases. Entelo uses proprietary algorithms to focus on candidates who are more likely to change jobs, and to identify candidates from under-represented backgrounds. It also provides an initial means of stack-ranking and scoring CVs, enabling companies to

continually score candidates against job openings and to create dynamic talent pools.⁴⁵

Case Study: Glassdoor – Bringing Transparency to the Job Market

Glassdoor helps employers promote their brand to active jobseekers, and advertise openings to others who might be ideal for the job but are not aware of the opportunity. Glassdoor's employer-review platform also helps talent get a clearer idea of the management style and policies of prospective employers. The platform relies on current and former employees contributing anonymous reviews of companies. Its users have generated more than 7.5 million reviews, ratings and salary reports that now cover more than 340,000 companies in over 190 countries. Glassdoor's valuation is close to \$1 billion.

Other technology trends are also reshaping recruitment. Partial automation of entry-level jobs is expected to change the number of junior staff that companies recruit. This may lead to a shrinking corporate pyramid and flatter organizational structures – developments that would require an adjustment to hiring strategies. Some companies are already preparing for this new dynamic: EY in the United Kingdom and Ireland expects the number of graduates it recruits to fall by 50% by 2020. (The company hired 1,200 graduates in 2015).⁴⁶

Beyond the added efficiency that digitalization can bring to recruitment, firms need to consider the long-term sustainability of their recruitment plans. Identifying the skills of the future and investing in them are critical to remaining sustainable. This is especially challenging when the future may bring as yet unimagined roles requiring new skills in data science, intuition, pattern finding, and dealing with complexity and change management.

Case Study: The Big Four in Accounting – Changing Hiring Practices with Data Analytics

As entry-level work becomes increasingly automated, the Big Four accounting firms are changing their hiring practices and looking to include more “algorithm design geeks”. As Adrian Stone, UK Head of Audit at KPMG, explained, “We're not at the stage of computers replacing people. Right now the challenge is to make sure we have the correct balance of people who will do the interpreting and people who will make sure computers are set up to interrogate properly.” Jon Raphael, Chief Innovation Officer at Deloitte in New York, said the company was “starting to hire more specialists to help with data analysis and data acquisition”.⁴⁷

Training talent

With the number of entry-level jobs in Professional Services forecast to fall, training young professionals on the job is likely to become more difficult. The expectations of millennial talent magnify the problem: 58% of recent graduates expect to pursue on-the-job learning, with opportunities for real-time coaching and feedback. Only 38% expect to pursue employer-provided formal training.⁴⁸ This disconnect between the expectations of young professionals and the future state of recruitment in the industry signals the need to

rethink the learning model for young people entering the sector.

Although automation's role in the industry will grow in importance, the quality of recruits will remain paramount. Competitive advantage will derive from producing outputs of impeccable quality on an otherwise level playing field. Merely substituting robots for human workers risks removing the “human touch” from work and increases the likelihood of “mechanical” errors creeping in. This underlines the importance of training employees to work hand in hand with machines.

Advances in technology are also changing training and education by democratizing access to knowledge, enabling individuals to become lifelong learners. This is leading to shifts in how people learn, the availability of educational resources, and access to learning opportunities. Learners can use a continually growing knowledge base on demand through massive open online courses (MOOCs). Udacity, a leading provider of MOOCs, offers nanodegree programmes to prepare students for careers in fields such as data science, machine learning, and Android or iOS development. In addition to providing tailored programmes for individuals, Udacity partners with companies to deliver training for in-demand skills.

VR is another technology redefining how individuals acquire knowledge. Immerse Learning is a company that specializes in harnessing this technology for training; it creates an immersive learning experience, allowing users to adapt to new environments.

Designing the employee experience

Professional Services firms must take into account the mindset of the upcoming generation of employees. Nearly three-quarters of future talent would choose to work at an organization with an engaging, positive social atmosphere, even if it meant accepting a lower salary. Only one in seven graduates wants to work for a large company, believing smaller employers provide the opportunities and social culture they seek. Large corporations will therefore need to adapt their culture to attract fresh talent.⁴⁹

As a result of this evolution in expectations, employee experience design is emerging, where processes, structure and culture are reshaped at an organizational level, and tools are redesigned to be not only organization-centric, but also employee-centric.⁵⁰ Moreover, companies are using AI to keep staff motivated by setting fitness goals, sleep objectives and medical check-ups.⁵¹

89%

Proportion of employees who believe their performance will significantly improve if performance management is changed further⁵²

Performance management is also being revisited to better account for the diversity of workforce segments, become more open and transparent, foster real-time conversations and coaching, and move people-related decisions closer to those involved.⁵³

Inhibitors and Key Questions

Advances in digital technology and shifts in economies could revolutionize Professional Services. However, the following barriers to change, as well as important questions for members of the industry, need to be addressed.

1. The innovator's dilemma. Certain trends within the industry underline the need for Professional Services firms to constantly reevaluate their business and operating models and, if necessary, confront the innovator's dilemma. The modularization of work and ubiquity of data are making professionals' work more widely understood by clients. The "platformization" of the professions means that expertise is not necessarily sought from the nearest expert, but the best one. Professional Services firms therefore need to continuously challenge the way they do things and be willing to reinvent themselves, with the agility to execute at pace.

Key question: Are you ready to adopt technologies that may disrupt your own market in the short term?

2. Low adoption rates of technology. From top management to front-line managers who actually work hand in hand with machines, the trust in advice provided by intelligent systems is rapidly declining (see Figure 6).

Managers have an incomplete understanding of what they may need to thrive in a partnership with intelligent machines. Managerial ranks suffer from a trust gap and a lack of a clear path for realizing the opportunity presented by automation and augmentation.

Key question: Are managers at all levels in your organization ready to trust machines with their work?

3. Traditional key performance indicators. Like their counterparts in other industries, firms in Professional Services focus on maximizing financial value through metrics such as quarterly shareholder returns, profitability and chargeability. In contrast, start-ups are not encumbered by a short-term focus on traditional performance measures, which allows for greater risk-taking. To truly spur innovation in the Professional Services industry, employees need to think in the long term by re-examining performance measures.

Key question: Are you using long-term performance measures to encourage risk-taking and innovation?

Figure 6: Percentage of Managers Who Strongly Trust the Advice of Intelligent Systems



Source: Accenture, *Managers and machines*, unitel, 2015

Imperatives for Industry and Societal Implications

Inspiring leadership is critical to digital success. An illustrative list of near-term and one-year action plans have been developed to help executives become effective digital leaders.

Inspiring leadership for digital transformation

In today's disruptive and uncertain market environment, CEOs may decide to focus on experimentation, using real-time data for instant feedback about the effectiveness of strategic initiatives. Shorter-term planning cycles could be beneficial. CEOs should also bear in mind that, with the pace of change so rapid, using past data to guide future actions is unlikely to be successful. A culture of constant, iterative experimentation is more effective.⁵⁵

Strong board- and CEO-level sponsorship is vital if digital transformation is to have a significant and lasting impact at a

company. Leaders are encouraged to be bold in exploring options for dramatically changing what their companies do (the business model) and how it is done (the operating model). Thinking without constraint about how the industry's landscape could be reshaped over the next 10 to 15 years will be central to reimagining Professional Services.

Imperatives for Professional Services executives

The list of near-term and one-year action plans set out here are for executives looking to transform their companies' businesses and operating models with digital technologies.

Digital theme	Near-term action plan	One-year action plan
<p>Business model transformation</p> 	<ol style="list-style-type: none"> 1. Gather information on business model changes being made by direct competitors and companies in related or adjacent spaces, and assess suitability. 2. Cultivate a market research team that works closely with data scientists to identify new needs and thus create new data-based services. 3. Create a list of disruptors and other organizations to partner with to gain synergies. Map this against a list of functions that the company doesn't need to perform in-house to create a list of priorities. 	<ol style="list-style-type: none"> 1. Deploy incubator capabilities to open up to a new environment of start-ups, customers, think tanks, suppliers and even competitors and thus create marketplace differentiation. 2. Develop additional subscription-based offerings backed by data.
<p>Intelligent automation</p> 	<ol style="list-style-type: none"> 1. Build a comprehensive view of labour-intensive business processes or specific applications that require frequent and manual updates. Identify opportunities to modularize work and to invest in automation and machine-learning capabilities. 2. Cultivate data talent, and develop a plan to build, buy and/or partner to improve data and automation know-how. 3. Create a "people first" strategy to plan organizational transition, training employees to keep skills up to date.⁵⁶ 	<ol style="list-style-type: none"> 1. Review the top areas for automation and machine-learning projects as determined in the immediate action plan. Implement one plan as a pilot. 2. Create training programmes to ensure talent is educated in the latest deep-learning and AI technologies. 3. Develop a research and development function for Professional Services.

	Near-term action plan	One-year action plan
<p>Digital agility</p> 	<ol style="list-style-type: none"> 1. Clarify the company's engagement with freelancers from legal and operational standpoints. 2. Conduct an as-is analysis of smart infrastructure used in the company. Map it against the latest infrastructure in the market. 3. Encourage digital adoption within organizations by pressing on with introducing "simpler" technologies, thus gradually increasing the acceptance of digital technologies. 	<ol style="list-style-type: none"> 1. Make rapid decisions and execute them. Reinforce senior leadership alignment around critical topics so that parties are already aligned when rapid decisions are required. 2. Establish the right digital traction metrics so that the company does not rely solely on financial metrics to gauge performance.⁵⁷ 3. Explore how multigenerational boards can be used to promote organizational agility. 4. Evaluate the need to establish or partner with a platform.
<p>Talent empowerment</p> 	<ol style="list-style-type: none"> 1. Analyse if hiring is leveraging the latest technology and platforms, and is agile enough to adapt to transforming organizational needs. 2. Determine what investments in infrastructure, platforms, technology and people are needed to deliver high-quality training across the workforce. 3. Recreate the company's engagement strategy to factor in millennials' demands. Develop a plan that allows employees to move freely through the organization and find work that best matches their interest and capabilities. 	<ol style="list-style-type: none"> 1. Create a culture of lifelong learning. Commit to employees' development by promoting learning agility through nanodegree exercises. 2. Proactively plan for the organization's need for skills. Leverage AI to develop customized learning paths for the organization's talent. 3. Integrate predictive analytics into human resources (HR). Pair an HR team with data scientists to derive new insights from the organization's workforce.

Is society ready for technology-driven professionals?

Societal benefits

While digital transformation is helping the Professional Services industry scale up and make its offerings more affordable and accessible, the effects of digital innovation are also rippling beyond the industry. Both employees and members of civil society are already starting to reap the benefits.

Employees can gain in numerous ways. Automation and smart infrastructure enhance their productivity, freeing up time for leisure activities or intellectual pursuits. Platforms provide employees with unprecedented access to new career avenues, both by enhancing their ability to showcase their skills and by making it easier for them to find suitable opportunities. This should maximize the chances of workers achieving their true potential and finding meaningful work. Tools for collaboration and flexible business models give employees the option to work from anywhere – for example, by giving parents, especially mothers, a greater opportunity to participate in the workforce.

Society at large will also benefit from digitalization. Data mining and digital platforms are already making public institutions, such as courtrooms and taxation offices, more

efficient, saving many man-hours of process-oriented work. AI and other technologies are driving down the cost to serve, making it inexpensive and convenient for citizens to access Professional Services. DoNotPay and TurboTax, examples of disruptors in the industry, are automating legal advice and taxation, respectively.

Case Study: DoNotPay – A Pro Bono Robot Lawyer

DoNotPay, a robot lawyer, was initially set up to use AI to help users contest parking tickets through an easy-to-use chat-like interface. It has overturned more than \$4 million in fines from over 100,000 parking tickets in London and New York, and has achieved a 64% win rate out of the 250,000 cases filed. A freely available tool, DoNotPay asks users questions, such as, "Were you or someone you know driving?" If the bot determines that an appeal is justified, it generates a letter that can be brought to the appeals court. DoNotPay is now turning its pro bono efforts to homelessness, enabling wrongly evicted tenants to file a case to get shelter and claim relief. The company's other services also help various groups, including travellers to deal with flight-delay compensation, HIV-positive people to better understand their rights, and refugees to navigate foreign legal systems.⁵⁸

Mitigating the risks posed by digitalization

Digital innovation is expected to unlock benefits for both professionals and citizens. However, technology poses risks when it takes over aspects of work presently performed by people. Mitigating the potentially negative societal consequences of digitalization in Professional Services will be critical. As Paul Virilio, a cultural theorist and philosopher, said, "The invention of the ship was also the invention of the shipwreck".

Ethics and morality

Ethical decisions traditionally made by professionals may be left to machines, which raises important questions. For example, predictive algorithms are available that sentencing judges can use to score offenders, based on the latter's risk of committing future crimes. Society may not be comfortable relying on technology to make such significant moral decisions. This may be a limitation of digitalization in the Professional Services industry, and a space that should be reserved for human judgement.

Case Study: COMPAS – Machines Making Life-or-Death Decisions

The Correctional Offender Management Profiling for Alternative Sanctions (COMPAS) is a 137-question test used to support sentencing decisions in the United States. The questions cover criminal and parole history, age, employment status, social life, education level, community ties, drug use and beliefs. Use of the algorithm has been challenged in court. In fact, a convict recently appealed his sentence on the basis that COMPAS violated his due-process rights because the company making the test, Northpointe, does not reveal how it weighs the answers to arrive at a risk score. The convict also challenged COMPAS on the grounds that the evaluation treats men as representing a higher risk than women.

A widening skills gap

As technology advances, requirements for skills change swiftly, making it harder for workers to keep their skills up to date. According to a recent survey conducted by ManpowerGroup,⁵⁹ 40% of employers globally report talent shortages (versus 30% reporting such shortages in 2009). Research by the World Economic Forum found that by 2020, across most occupations, more than a third of the most-sought-after core skill sets will comprise those that are not considered crucial to jobs today.⁶⁰ With a short skill cycle, training and development are becoming critical to address talent shortages.

Impact on jobs and inequality

John Maynard Keynes, the British economist, coined the term "technological unemployment" in 1930. He predicted that technological advances would lead to machines replacing workers. Analysis by the White House Council of Economic Advisers suggests that the negative effect of automation is expected to be greater on lower-wage jobs, widening the wage gap between less educated and more educated workers. Automation's impact could be relatively more pronounced in emerging markets, as most of the large Professional Services firms have built up workforces there to do low-cost, routine tasks.

Without doubt, technology is expected to be net value additive: the economic pie will likely become bigger. However, some sections of society could get smaller slices than they once did, potentially exacerbating already rising levels of inequality.

The way ahead

In a 1962 speech, US President John F. Kennedy declared, "We believe that if men have the talent to invent new machines that put men out of work, they have the talent to put those men back to work". Some governments and parts of the private sector are trying to do just that, by finding innovative ways to create new jobs. They are also piloting innovative responses to potential inequality and job losses, with universal basic income proposed as a possible solution. No consensus currently exists on the best way to resolve these issues, but the ever-increasing realization is that industry, government and civil society must work together to overcome the skills gap and minimize the societal impacts of technology-driven job losses and growing inequality.

Glossary of Digital Technologies

Technology	Description	Example companies
3D-video telepresence	3D-video telepresence eases collaboration by providing disparate parties with a lifelike visual experience, so that participants perceive themselves to be together in the same place.	Microsoft
Augmented reality applications	Augmented reality (AR) is the real-time use of information in the form of text, graphics, audio and other virtual enhancements integrated with real-world objects, and presented using a head-mounted display or projected graphic overlays. This real-world element differentiates AR from virtual reality. Elements of AR applications are becoming social, and are increasingly centred on context-aware, location-based services for mobile devices.	Aurasma, Iryss
Blockchain/distributed ledgers	A blockchain or distributed ledger is a "transaction database" shared by all participants in a network. The distributed ledger contains every transaction ever executed between the participants. With this information, anyone can trace back a value belonging to any participant at any point in history.	Hyperledger, Ripple Labs
Deep learning	Deep learning is a set of machine-learning algorithms that includes various deep neural network models. An increasingly popular variant of neural networks, it has many more than the typical two processing layers. The additional layers make it possible to identify higher-level abstractions (i.e. features) and improve classification and prediction accuracy.	IBM Watson, Kaggle
E-discovery software	Electronic discovery (e-discovery) software facilitates identifying, collecting, preserving, processing, reviewing, analysing and producing electronically stored information to meet mandates imposed by common-law or investigative requirements for discovery. The Electronic Discovery Reference Model breaks typical e-discovery into a six-step, nine-process framework.	FTI Technology, IBM, KPMG, Kroll
Heuristic automation	Heuristic automation is knowledge- and analytics-driven. It involves collecting, analysing and applying human- and machine-based learning and intelligence to take specific automated actions.	Aria Networks, INETCO Systems
Human body augmentation	Human body augmentation integrates cognitive and physical improvements with the human body to deliver performance that exceeds normal human limits. Examples of augmentation include increased physical strength through exoskeletons, improved perception through sensory transference or adjustable aids (e.g. a hearing aid with a phone app to optimize directionality), and enhanced concentration and learning through electrical stimulation of the brain.	Cyberdyne, Raytheon

Technology	Description	Example companies
Machine learning	Machine learning allows computers to learn from data without being explicitly programmed. Supervised learning aims at learning classifications or estimations; unsupervised learning seeks to extract anomalies, patterns and relationships from data via methods such as clustering, reducing dimensions and estimating density.	GE Intelligent Platforms, H2O, IBM, Microsoft, SAP, SAS
Natural language processing	Natural language processing consists of technology categories that make human-computer interaction easier and help people find, understand and act on content existing in their native language, such as translating, summarizing and synthesizing. It also provides the foundation for inferences that make people more effective, such as finding people most likely to be experts on a subject, or subjects trending among their peers.	IBM Watson, Microsoft, Narrative Science, SAS
Smart advisers	Smart advisers are a class of smart machines that advise users about the state of operations, make recommendations on the best decisions to take, or give the best answers to users' questions. Natural language processing is typically necessary for advisers to interact with people.	IBM Watson, IPsoft, Saffron
Smart robot	A smart robot is a machine with an electromechanical form factor that can work autonomously in the physical world while learning from its experiences. Smart robots sense conditions in their local environments, recognize and solve basic problems, and learn how to improve their performance. Some have a specialized functional form (e.g. warehouse robots), while others have more general functional forms and/or humanoid appearances. Because of their sensory capabilities, smart robots may work alongside people.	Google, iRobot, Panasonic
Smart workspace	A smart workspace creates a connected physical network of "places and things" that actively interacts with software applications to contextualize people's experience in the digital workplace. It leverages the growing digitalization and programmability of physical objects brought about by the Internet of Things, enabling organizations to deliver new ways of working, sharing information and collaborating to improve workforce efficiency and effectiveness. Any location where people work can become a smart workspace.	Microsoft, Oblong, Prysm
Social learning platform	A social learning platform is an extension of traditional systems for learning management and learning content management that incorporates features of social software to support structured social, informal and formal learning activities. Such a platform enables learners to establish a social profile that reflects their expertise and interests; to create, discuss, share and capture learning content; and to interact with peers in their social networks.	IBM (Kenexa), Oracle, SAP

Technology	Description	Example companies
Speech recognition	Speech recognition systems convert human speech into text or machine instructions.	Amazon, Apple, Google, IBM, Microsoft
Virtual personal assistant	A virtual personal assistant (VPA) performs some of the functions of a human personal assistant. With the user's permission, it observes user content and behaviour, builds and maintains data models (from which it draws inferences about people, content and contexts), predicts users' needs, builds trust and acts autonomously on the user's behalf. VPAs make everyday tasks easier (by prioritizing emails, for example), and generally boost their users' efficiency.	Google, IBM, Microsoft, x.ai
Virtual reality	Virtual reality provides a computer-generated 3D environment that surrounds a user and responds to the individual's actions in a natural way, usually through immersive head-mounted displays. Gesture recognition provides hand and body tracking, and haptic (or touch-sensitive) feedback may be incorporated. Room-based systems provide a 3D experience for multiple participants; however, they are more limited in their capability to interact.	NextVR, Oculus VR, Presagis, Sony, WorldViz

Appendix

Defining human capabilities

Figure 4 illustrates how digital technologies can augment some human capabilities that professionals rely on to provide expertise to clients. The following are definitions for the human capabilities included in the figure:

THINK

Insight generation

The mental action of processing acquired knowledge and converting it into valuable outputs using judgement

Creativity

The ability to transcend traditional ideas, rules, patterns, relationships or the like, and to create meaningful new ideas, forms, methods and interpretations

Cognition

The process of acquiring knowledge and understanding through thought, experience and the senses

Memory

The faculty by which the mind stores and remembers information

DO

Communication

The act or process of using words, sounds, signs or behaviours to express or exchange information, or to express ideas and thoughts

Presentation

The activity of showing, describing or explaining something to a group of people

Organization

The act or process of putting the different parts of something in a certain order so that they can be found or used easily

FEEL

Relationship building

The act of building connections between two parties

Empathy

The ability to understand and share the feelings of another

Instinct

A natural or inherent aptitude, impulse or capacity

Appearance

The way that someone or something looks

Case studies for augmenting human capabilities

Figure 4 also includes case studies that illustrate how digital technologies can augment professionals' ability to serve their clients. Some of these case studies are in the main body of this White Paper, with details of the remaining ones here:

Case Study: Project Dreamcatcher

Dreamcatcher is a generative design system that enables manufacturing designers to craft a definition of their design problem through goals and constraints. This information is used to synthesize alternative design solutions that meet the objectives. Designers are able to explore trade-offs between many alternative approaches and select design solutions for manufacture. The Dreamcatcher system allows designers to input specific design objectives (e.g. functional requirements, type of material, manufacturing method, performance criteria, cost restrictions). The system evaluates how well the vast number of designs it generates satisfy these specifications. The resulting designs are then presented back to the user, along with performance data relating to each solution. Designers are able to evaluate these solutions in real time, returning at any point to the problem definition to adjust goals and constraints to generate new results.

Case Study: Rembrandt

A new "Rembrandt" painting was revealed this year – a mere 350 years after the artist's death. Researchers taught an AI programme to paint this new Rembrandt after analysing more than 300 of his paintings. Using a 3D printer, they were even able to recreate his exact brush strokes. It took almost 18 months to produce the computer-generated, 3D-printed painting.

Case Study: IBM Watson

A cognitive computing platform that understands data, IBM Watson is able to reason and can learn at scale. Watson analyses unstructured data including news articles, research reports, social media posts and enterprise system data. It then evaluates all possible meanings and determines what is being asked. Based on supporting evidence and the quality of information found, it presents solutions. In 2011, Watson answered questions on the quiz show, Jeopardy!, while competing against two former winners of the show, and won the first-place prize of \$1 million. In February 2013, IBM announced that the Watson software system's first commercial application would be in partnership with health insurance companies. The system would be deployed to help evaluate the appropriateness and medical need for various lung cancer treatments. Watson has also found a niche in the legal sector, in the guise of Ross, the first artificially intelligent lawyer.

Case Study: DeepMind

DeepMind, a British artificial intelligence company, was founded in September 2010 and acquired by Google four years later. DeepMind's goal is to "solve intelligence" by combining "the best techniques from machine learning and systems neuroscience to build powerful general-purpose learning algorithms".⁶¹ DeepMind is trying to formalize intelligence, not only to implement it in machines, but also to further understand the human brain. The company made headlines in 2016 after its AlphaGo programme achieved a landmark victory in the board game, Go, against one of the world's best human players. DeepMind is working with the National Health Service in the United Kingdom to analyse medical data and find ways to improve how illnesses are diagnosed and treated.

Case Study: Robo Brain

Robo Brain is a large-scale computational system that learns from publicly available internet resources, computer simulations and real-life robot trials. It collects everything related to robotics into a comprehensive and interconnected knowledge base. At the same time, it learns concepts by searching the web; interprets natural language text, images and videos; and has the ability to watch humans with its sensors and learn from interacting with them. It stores this vast trove of information within itself, rather like a human brain would. Applications include prototyping for robotics research, household robots and self-driving cars. Robo Brain is a multi-university, open-source effort, addressing research challenges in various domains: machine learning, perception and large-scale data processing.

Case Study: Quill (Narrative Science)

Powered by AI, Quill is Narrative Science's advanced natural language generation platform for enterprise organizations that goes beyond reporting the numbers – it creates fluently written, meaningful narratives for different audiences. Advances in data visualization and data science are creating powerful insights. Quill's strength is to convert these insights into easily understandable explanations and narratives. Quill immediately adds value to data by identifying the most relevant information and conveying it through professional, conversational language. By efficiently communicating the key points buried in data, the platform makes it easier for users to understand and act on these insights. According to Narrative Science, the Associated Press uses Quill to automate the writing of earnings reports, enabling the company to expand cost-effectively the number of firms it covers (from 300 to 4,400), while simultaneously freeing up journalists to focus on more complex tasks.

Case Study: Amelia

IPsoft, which specializes in autonomic and cognitive technologies, describes its product, "Amelia", as a cognitive agent that "can take on a wide variety of service desk roles and customer experience".⁶² Enfield Council, in north London, has recently agreed to deploy Amelia to help with its customer service. The AI programme will be used to participate in thousands of conversations at once and answer queries in a human way. Its role will be to help residents find

information online and fill in forms, guiding users through a chat feature on their computer screens. Any questions that Amelia cannot answer will be referred to a human colleague. Accenture and IPsoft are collaborating on an Accenture Amelia practice, designed to accelerate client adoption of AI, with a view to improving business outcomes and creating new growth opportunities.

Case Study: BeamPro

The BeamPro telepresence robot allows users to interact remotely by coupling high-end video and audio with the freedom to move around a space. It consists of an LCD screen, two wide-angle cameras and an array of six microphones on a wheeled base that can move around a room at walking pace. By offering face-to-face interaction on the move, it facilitates effective presentation and communication around the globe.

Case Study: Magic Leap

Focusing on AR, Magic Leap promises that "the world is your screen", and that its experience will allow the user to do anything normally done on another phone or computer – what it terms "hyperpersonal computing". Magic Leap's initial areas of focus include creating apps and experiences for gaming, entertainment and communication. To become a viable alternative to smartphones or laptops, Magic Leap would need to create a groundbreaking input and control method for the user. Development is still at an early stage.

Case Study: Sophia

A robot that resembles a human woman with rubbery skin, Sophia can make numerous natural-looking facial expressions, using cameras in her eyes. This eerily realistic robot is designed to potentially work in healthcare, education or customer service. The aim is for Sophia to be as conscious, creative and capable as any human; according to her inventor, Hanson Robotics, this will be achievable in the next 20 years.

Case Study: Pepper

Pepper is a robot capable of identifying the most important human emotions: joy, sadness, anger or surprise. It can interpret a person's facial expressions, tone of voice, words used and body language. Aggregating and analysing this information enables the robot to determine whether its human interlocutor is in a good or bad mood. Business uses for Pepper include transforming customer experience with personalized services. Since 2014, about 2,000 Pepper robots have been deployed in the SoftBank shops in Japan. Nestlé Japan began integrating Pepper into its Nescafé stores in December 2014, and plans to equip about 1,000 stores with Pepper to inform customers about products and services.

Acknowledgements

The World Economic Forum would like to acknowledge and extend its sincere gratitude to a broad community of contributors across Partner companies, technology start-ups, academics and experts.

Digital Transformation Initiative Project Team Contributors

Jon Aarons, Senior Managing Director, FTI Consulting
Alwin Brunner, Chief Information Officer, Heidrick & Struggles
Oliver Campbell, Global Head, Client Service Solutions, Clifford Chance
Andrew Chamberlain, Chief Economist, Glassdoor
John Dzrik, President, Global Risk and Specialties, Marsh
Dan Elron, Managing Partner, Corporate Strategy, Innovation and Technology, Accenture
Eric Gervet, Partner, A.T. Kearney
Anthony Goldbloom, Founder and Chief Executive Officer, Kaggle
Mark Goodburn, Chairman, Global Advisory, KPMG International
Alison Gross, Global Director, Strategic Engagement, Willis Towers Watson
Charlotte Hallward, Manager, External Communications, McKinsey & Company
Charlotte Harding, Director, Research, Mercer (MMC)
Tamsin Hussey, Senior Digital Strategist, Infosys
Karim Jalbout, Head, Digital Europe and Big Data, Egon Zehnder
Tim Jones, Global Head of Management Consulting, KPMG International
Stephane Kasriel, Chief Executive Officer, Upwork
K. Ananth Krishnan, Chief Technology Officer, Tata Consultancy Services
Paul Lewis, Partner, Co-Head of Innovation, Linklaters
Nick McKee, Head, Strategy and Corporate Development, Marsh & McLennan Companies (MMC)
Jory Marino, Vice-Chairman, Heidrick & Struggles
Xavier Mesnard, Lead Partner, Strategic Operations Practice, A.T. Kearney
Rich Pearson, Senior Vice-President, Marketing and Categories, Upwork
Massimo Portincaso, Director, Global Marketing, The Boston Consulting Group
Michael Poulos, Managing Director, President, Marsh Risk Consulting and Head of Client Advisory Services, Marsh
Jonas Prising, Chairman and Chief Executive Officer, ManpowerGroup
Anne Pullum, Head, Strategy, Willis Towers Watson
Satya Ramaswamy, Vice-President and Global Head, Digital Business, Tata Consultancy Services

John Romeo, Managing Partner, North America, Oliver Wyman Group (MMC)
Marcus Sawyerr, Global Head, Digital Innovation, Adecco Group
Erik T.H. Scheer, Partner and Member of the Executive Committee, Baker & McKenzie
David Shalders, Director, Group Operations and Technology, Willis Towers Watson
Léonor Siney, Director, Global Media Communications, Adecco Group
Richard Susskind, Advisory Board Member and Visiting Professor, Oxford Internet Institute, University of Oxford
Mansi Vadodaria, Head, Financial Planning Group, Tata Consultancy Services
Fiona Vickers, Senior Client Partner, Lead Digital in EMEA, Korn Ferry
Bas Boris Visser, Global Head, Innovation and Business Change, Clifford Chance
Chris Wanstrath, Chief Executive Officer and Co-Founder, GitHub
Gregory Willis, Chief Information Officer, FTI Consulting
Anja Wittrup, Director, Global Corporate Affairs, Bain & Company
Sigal Zami, Vice-Chairman, PwC
Adam Zuckerman, Employee Engagement Practice Leader, Willis Towers Watson

Contributors

World Economic Forum

Mark Spelman, Co-Head, System Initiative on Shaping the Future of Digital Economy and Society

Sonja Patscheke, Head, Professional Services

Bruce Weinelt, Head, Digital Transformation

Reema Siyam, Project Lead, Digital Transformation Initiative

Kirsten Williams, Project Specialist, Digital Transformation Initiative

Accenture

Trevor Gruzin, Accenture Strategy, APAC Lead

Harshdeep Jolly, Accenture Strategy and World Economic Forum Seconded

Anand Shah, Accenture Strategy, Digital Transformation Initiative Engagement Partner

Arushi Chopra, Accenture Strategy

Endnotes

- ¹ Burns, Edgar, “How does a short history of professions help us think about professionalisation today?”, Conference Paper: 14th Australia Studies Conference in China, ResearchGate, 2014.
- ² In this White Paper, Professional Services include legal, accounting, consulting and human capital firms.
- ³ UK Office for National Statistics, *170 Years of Industrial Change across England and Wales*, 2011.
- ⁴ US Bureau of Labor Statistics, *Employment Projections*, 2015.
- ⁵ PwC, *What are Professional Services?*
- ⁶ Planning Commission, Government of India, *Sector-wise contribution of GDP of India*, 2015.
- ⁷ Susskind, R. and D. Susskind, *The Future of the Professions: How Technology Will Transform the Work of Human Experts*. Oxford: Oxford University Press, 2015.
- ⁸ International Monetary Fund, *GDP*, 2015.
- ⁹ Siemens company website, <https://www.siemens.com/global/en/home.html>.
- ¹⁰ Lipman, Keith, “Insourcing and the problem of value to price”, *Inside Counsel*, 23 February 2016, <http://www.insidecounsel.com/2016/02/23/insourcing-and-the-problem-of-value-to-price>.
- ¹¹ Grossman, Rhys, “The industries that are being disrupted the most by digital”, *Harvard Business Review*, 21 March 2016.
- ¹² Gartner, *Market Share Analysis: Consulting Services, Worldwide*, 2011.
- ¹³ Gartner, *Market Share Analysis: Consulting Services, Worldwide*, 2015.
- ¹⁴ “Accounting jobs most at risk from automation, warns PwC”, *Accountants Daily*, <http://www.accountantsdaily.com.au/latest-news/17-news/8188-accounting-jobs-most-at-risk-from-automation-warns-pwc>, 2015.
- ¹⁵ Knowledge@Wharton, “How Professional Services Can Disrupt Its Way Out of Automation”, 5 November 2015, <http://knowledge.wharton.upenn.edu/article/how-professional-services-can-disrupt-its-way-out-of-automation/>.
- ¹⁶ Deloitte, *Developing legal talent: Stepping into the future law firm*, 2016.
- ¹⁷ Kalia, Jaishree, “Robot law: Deloitte estimates automation to cut legal sector jobs by 39% over the next two decades”, *Legal Business*, 16 March 2016, <http://www.legalbusiness.co.uk/index.php/lb-blog-view/5713-robot-law-deloitte-estimates-automation-to-cut-legal-sector-jobs-by-39-over-the-next-two-decades>.
- ¹⁸ Deloitte, *Developing legal talent: Stepping into the future law firm*, 2016.
- ¹⁹ Gartner, *Understanding Gartner’s Hype Cycles*, 2015.
- ²⁰ Susskind and Susskind, op. cit.
- ²¹ US Internal Revenue Service, 2015.
- ²² Addady, Michal, “Meet Ross, the World’s First Robot Lawyer”, *Fortune*, 12 May 2016, <http://fortune.com/2016/05/12/robot-lawyer/>.
- ²³ Legal IT Insider, “Deloitte Insight: Over 100,000 legal roles to be automated”, 16 March 2016, <http://www.legaltechnology.com/latest-news/deloitte-insight-100000-legal-roles-to-be-automated/>.
- ²⁴ Sanghani, Radhika, “Technology leads to 84pc increase in office productivity”, *The Telegraph*, 22 October 2013, <http://www.telegraph.co.uk/technology/news/10396263/Technology-leads-to-84pc-increase-in-office-productivity.html>.
- ²⁵ Gartner, *Understanding Gartner’s Hype Cycles*, 2015.
- ²⁶ Intuit, *7.6 Million People in On-Demand Economy by 2020* [Press Release], 13 August 2015.
- ²⁷ Susskind and Susskind, op. cit.
- ²⁸ Dinham, Peter, “KPMG, IBM team up to apply cognitive tech to professional services”, *ITWire*, 30 June 2016, <http://www.itwire.com/it-industry-news/market/73587-kpmg,-ibm-team-up-to-apply-cognitive-tech-to-professional-services.html>.
- ²⁹ Accenture, “Accenture Open Innovation”, <https://www.accenture.com/us-en/technology-insight-open-innovation>.
- ³⁰ Susskind and Susskind, op. cit.
- ³¹ Popper, Nathaniel, “The Robots are Coming for Wall Street”, *The New York Times Magazine*, 25 February 2016, http://www.nytimes.com/2016/02/28/magazine/the-robots-are-coming-for-wall-street.html?_r=0.
- ³² X.ai company website, <https://x.ai>.
- ³³ O’Reilly, Lara, “People are sending flowers and chocolate to thank personal assistant ‘Amy Ingram’ — what they don’t realize is she’s a robot”, *Business Insider*, 10 July 2015, <http://www.businessinsider.com/amy-ingram-personal-assistant-2015-7>.
- ³⁴ Ibid.
- ³⁵ “X.ai raises \$23 million more for Amy, the virtual assistant”, *Internet Dealbook*, 12 April 2016.

³⁶ According to Stephane Kasriel, Chief Executive Officer, Upwork.

³⁷ Zillman, Claire, "PwC Wants To Use 'Gig Economy' Workers to Staff Projects for Its Clients", *Fortune*, 7 March 2016, <http://fortune.com/2016/03/07/pwc-freelance-marketplace/>.

³⁸ Accenture, *The Impact of Technology on the Future of Work: From Looking Digital to Being Digital*, 2016.

³⁹ Gartner, *Five Principles for Leading an Agile Culture*, 2015.

⁴⁰ Hifarva, Arra Dianne, "Check Out Microsoft's Vision of A Future Without Mice and Keyboards", *Futurism*, 28 June 2016, <http://futurism.com/check-out-microsofts-vision-of-a-future-without-mice-and-keyboards/>.

⁴¹ Lawson, Stephen, "IBM and Cisco will make Watson into a virtual workmate", *Computerworld*, 1 July 2016, <http://www.computerworld.ph/tech/applications/ibm-and-cisco-will-make-watson-into-a-virtual-workmate/>.

⁴² Jagnow, Rob, "Daydream Labs: animating 3D objects in VR", *Google Developers Blog*, 28 June 2016, <https://developers.googleblog.com/2016/06/daydream-labs-animating-3d-objects-in-vr.html>.

⁴³ *What are Professional Services?*, PwC.

⁴⁴ Belton, Padraig, "How 'robo recruiters' could affect your job prospects", *BBC*, 27 May 2016, <http://www.bbc.com/news/business-36370340>.

⁴⁵ Weber, Lauren, "Can This Algorithm Find Hires of a Certain Race?", *The Wall Street Journal Blog*, 30 April 2014.

⁴⁶ Agnew, Harriet, "Technology transforms Big Four hiring practices", *Financial Times*, 9 May 2016, <https://www.ft.com/content/d5670764-15d2-11e6-b197-a4af20d5575e>.

⁴⁷ Ibid.

⁴⁸ Accenture, *The gig experience: Unleashing the potential of your talent and business*, 2016.

⁴⁹ Ibid.

⁵⁰ Ibid.

⁵¹ Silverberg, David, "The company that pays its staff to sleep", *BBC*, 30 June 2016, <http://www.bbc.com/news/business-36641119>.

⁵² Accenture, *Is performance management performing?*, 2016.

⁵³ Ibid.

⁵⁴ Accenture, *Managers and machines, unite!*, 2015.

⁵⁵ World Economic Forum, *Digital Transformation of Industries: Digital Enterprise*, White Paper, 2016.

⁵⁶ Accenture Technology Vision, *People First: The primacy of people in the digital age*, 2016.

⁵⁷ World Economic Forum, op. cit.

⁵⁸ Gibb, Samuel, "Chatbot lawyer overturns 160,000 parking tickets in London and New York", *The Guardian*, 28 June 2016, <https://www.theguardian.com/technology/2016/jun/28/chatbot-ai-lawyer-donotpay-parking-tickets-london-new-york>.

⁵⁹ ManpowerGroup, *2016-2017 Talent Shortage Survey*, 2016.

⁶⁰ World Economic Forum, *The Future of Jobs*, 2016.

⁶¹ Startupxplore website, <https://startupxplore.com/en/startups/deepmind>.

⁶² IPsoft website, <http://www.ipsoft.com/amelia/>.



COMMITTED TO
IMPROVING THE STATE
OF THE WORLD

The World Economic Forum, committed to improving the state of the world, is the International Organization for Public-Private Cooperation.

The Forum engages the foremost political, business and other leaders of society to shape global, regional and industry agendas.

World Economic Forum
91–93 route de la Capite
CH-1223 Cologny/Geneva
Switzerland

Tel.: +41 (0) 22 869 1212
Fax: +41 (0) 22 786 2744

contact@weforum.org
www.weforum.org