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The Digital Renaissance of Work: Delivering digital workplaces fit for the future

Paul Miller and Elizabeth Marsh

The world of work is experiencing an unprecedented transformation driven by technology. In this follow-up to The Digital Workplace: How technology is liberating work, Paul Miller, CEO and founder of the Digital Workplace Group, is joined by co-author Elizabeth Marsh to pick up the story and help organizations create digital workplaces fit for the future.

A unique combination of thought leadership and practical advice, this book will bring the reader up to date with the latest developments, such as: no jobs but lots of work; the new digital work ethic; why "teamwork" needs a makeover; the human-centred digital workplace; what this means for physical workplaces; and why the revolution starts with education.

It also provides essential guidance on how to deliver a productive and engaging digital workplace in your organization, explaining how to: assess maturity; make the business case; set up the programme; and measure progress.

See more about The Digital Renaissance of Work: Delivering digital workplaces fit for the future at: www.digitalworkplacegroup.com/the-digital-renaissance-of-work/#content

Contents

1. Preface from Paul Miller 4

2. Executive summary 5

3. What will the world be like in 2030? 7

4. Describing Digital Workplace 2030 12

5. Exploring Digital Workplace 2030 dimensions 13

Dimension 1: Space 13
Reinventing digital and physical space 13
Campus working 14
Hyper-collaboration 15
Coopetition and new partnerships 16

Dimension 2: Capability 18
From virtual to mixed reality 18
Touching the intangible 19
Wearable, implantable digital workplace 20
Organizations up their Digital IQ 22

Dimension 3: Intelligence 24
AI in the boardroom 24
The shape shifting workforce 27
Measurement becomes pervasive 28
Driving behaviour with data 29

Dimension 4: Beauty 32
Ubiquitous user interfaces 32
Health, wellbeing and happiness 33
Ethical, sustainable environments 34
Digital renaissance of work and society 35

6. What do organizations need to think and do now? 38

7. References 41

8. Other reading 45

9. Acknowledgements 46

1 Preface from Paul Miller

How can we possibly know what the digital worlds of work will be like in 2030? Then again, I am writing this at the start of 2018 – and, 12 years ago, Twitter was just about to launch and a year later we would see the arrival of the Apple iPhone. Viewed through that lens, 12 years is both a long time ago, but in other ways not so distant.

It is now eight years since my colleagues at Digital Workplace Group (DWG) and I began talking about the "digital workplace". What we described in 2010 as a hopefully useful term to encapsulate all the digital places where we work and services we use, has now grown into a major global industry. Given this evolution of the digital workplace, it now feels useful to project forward again and set out to define the new digital workplace through to the end of the next decade.

My thinking is that, if we know the shape of the digital worlds of work to come, we can prepare now as effectively, efficiently and intelligently as possible. This report offers a new way of defining the digital workplace and frames the next digital workplace era within four key dimensions – space, capability, intelligence and beauty.

The questions we would encourage organizations to ask are:

- If this is where the digital workplace is heading, where are we now on this journey?
- What can we start, stop or adapt in order to be well prepared for the digital worlds of work to come?
- Which stakeholders should we engage now in order to think and plan forward?
- Does this picture of the new digital worlds of work make sense for us – and what is missing?

When considering 2030, we drew on our 16 years of diagnostics, data, benchmarking, research and insight into practices from the early days of intranets through to the current waves of intelligent collaboration. We also trawled extensive "future gazing" literature to look for patterns and overlaps to establish the most common predictions from academia and industry. All of this was used as the foundational layer for the report, but then we also reflected on what we see happening in practice across hundreds of DWG clients, members and relationships globally – to arrive at our definition of the four key dimensions of the digital workplace future.

Many thanks go to the four experts from industry I interviewed, each of whom gave insights into the dimension most closely related to their own area of particular knowledge:

Dimension 1: Space – Ryan Anderson, Vice President of Product Marketing and Workplace Strategy, at Teem

Dimension 2: Capability – Pete Fields, Digital Workplace, Digital Platforms and Social Business Leader, at Wells Fargo

Dimension 3: Intelligence – Omar Divina, Vice President, Sales and Customer Success, at HyperScience

Dimension 4: Beauty – Dan Mullis, Senior Manager, Collaboration Services, at Adobe Systems

2 Executive summary

The practice of looking into the future and forming well-considered ideas about what we might find there requires of us both rigour and creativity. Organizations often use a 10-year timeframe for this process in order to stimulate creativity and suspend current operational thinking, while avoiding the process seeming too much like science fiction. On this basis, we selected the year 2030 as the anchor for our exploration of the future unfolding of the digital worlds of work.

We start by looking at the wider context of what the world will be like in 2030, picking up on key themes, such as major shifts in power between and within nations; the impact of environmental change and scarcity of resources; and, of course, the ongoing changes driven by technological innovations in all areas of our lives.

Of course, these innovations form part of a broader historical pattern of technological progress. As we consider the evolution of the digital workplace, it can help to take a step back and consider where these changes fit and the forces influencing them. Crucially, this can help guide the strategies and business models that we develop moving forwards.

Drawing on ancient Vitruvian principles of balance and proportion in architecture, we propose a framework for thinking about Digital Workplace 2030 that has four key dimensions: space, capability, intelligence and beauty. This sets the tone for an exploration of the future of work that is first and foremost about human flourishing and how we inhabit the digital worlds of work that we are already creating as well as those we have yet to create.

Each dimension explores different aspects of Digital Workplace 2030, from the physical and digital spaces in which we will collaborate and cooperate in **Dimension 1: "Space"**, the ways in which we will augment our human capabilities in **Dimension 2: "Capability"**, the intelligence that will power a data-driven, fluid organization that shapes and reshapes itself as needed in **Dimension 3: "Intelligence"**, to the experiential and ethical foundations of the future digital workplace in **Dimension 4: "Beauty"**.

This somewhat novel approach is intended to enable practitioners to take stock and think forward about the long-term trajectory for digital workplaces. Each dimension is complemented by reflections and commentary from respected figures in the industry. Finally, we close the report with some ideas on how digital workplace leaders can practically use these insights to challenge their thinking and strategies in the present.

2

Research methodology

The four dimensions of Digital Workplace 2030 are based on a broad scan of relevant literature from leading technology writers, such as Shel Israel, William Webb, Kevin Kelly and Callum Chace, and organizations such as McKinsey & Company, Accenture and Roland Berger. Each dimension was then reviewed by a leading expert and discussed with them in a qualitative interview, highlights of which are provided. The report does not seek to make predictions but rather to explore potential directions for workplace technology to help practitioners understand now the larger context and longer trajectory.

3 What will the world be like in 2030?

In the last couple of years, even the most informed and respected commentators have failed to predict the radical changes to the global political arena. No surprise then that futurists, always cautious in making their predictions, are now especially nervous when it comes to longer range forecasts. One thing they appear to agree on, however, is that the world in 2030 will be dramatically different from today.

"We are at a critical juncture in human history, which could lead to widely contrasting futures", wrote National Intelligence Council chairman, Christopher Kojm, in his introduction to the Council's "Global Trends 2030" report.[1] The report goes on to suggest that in the coming decades we will collectively experience a global transformation comparable in breadth and scope to the political and economic revolutions of the late 18th century. It will, however, happen at a much faster pace.

Most forecasts for our 2030 world focus in on: major shifts in power between and within nations; the impact of environmental change and scarcity of resources; and, of course, the ongoing changes driven by technological innovations in all areas of our lives. In one of the most comprehensive outlooks for this period, Roland Berger[2] identifies seven global megatrends that will shape the world in 2030:

1. **Changing demographics** – the first megatrend projects: a growth in world population to over 8 billion; ageing societies in which the median age increases by 5 years to 34 years; increasing urbanization with 59% of the world's population living in cities.

2. **Globalization and future markets** – globalization will continue, with real gross domestic product (GDP) growing by 4% p.a. to around USD135 trillion by 2030. Today's most powerful emerging markets – Brazil, Russia, India and China – are predicted to become the new economic superpowers.

3. **Scarcity of resources** – energy, water and other commodities will be scarce by 2030 and smart solutions will need to be found. As global demand for these resources grows, competition will intensify, and consumption and dependency will both need to be reduced.

4. **Climate change** – increasing CO_2 emissions (16% higher globally) will lead to rising temperatures (up 0.5–1.5ºC) and put the global ecosystem at risk, with increasing land loss, more extreme weather and decreasing biodiversity.

5. **Dynamic technology and innovation** – the fifth megatrend predicts the increased diffusion of technology as new innovations across robotics, virtual reality (VR) and the Internet of Things (IoT) are adopted faster and innovation cycles shorten. Innovation is particularly anticipated in the Life Sciences, with solutions to major health problems flowing from this sector.

3

6. **Global knowledge society** – the cross-linking of knowledge is expected to increase and gender gaps in education and employment will continue to narrow. The rising skill shortage in key countries and regions means the war for talent will intensify.

7. **Sharing global responsibility** – the final megatrend anticipates a shift to greater cooperation and responsibility shared among nations, caused by international crises and environmental risks. In parallel, it predicts the growing power of non-governmental organizations (NGOs) and increasing philanthropy.

The megatrends give indications of what our 2030 world may look like. However, how exactly the signals and signposts available to us today will manifest is extremely hard to know. Increasingly, futurists employ the acronym VUCA (volatility, uncertainty, complexity and ambiguity) when making their predictions. The term isn't a new one, but it does appear to be one that resonates increasingly strongly. The Futures Agency paints a picture of what this means as we consider our collective future[3]:

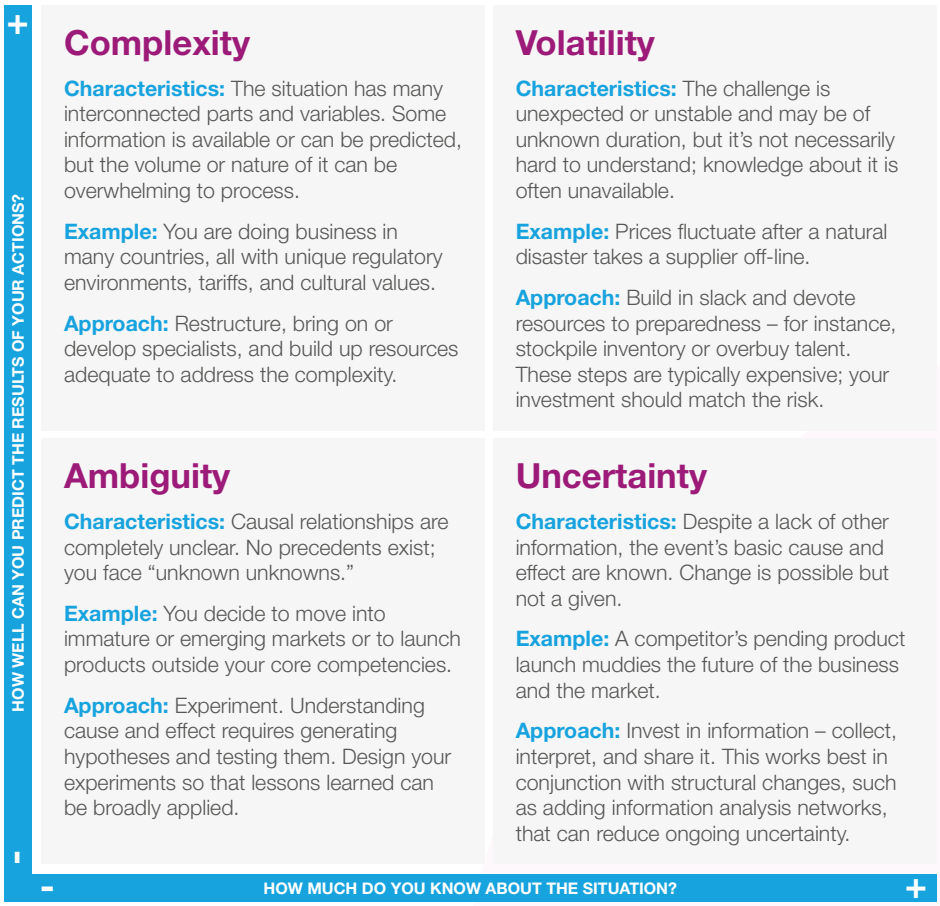

Figure 1: An explanation of VUCA.[3]

3

The “widely contrasting futures” referred to by Kojm are reflected in the varied nature of the predictions for 2030 and beyond. At their most optimistic, these depict a world of unparalleled human equality, fulfilment and leisure, in which the intractable problems of today have been solved by our technologies. At their more pessimistic, drastic damage or even annihilation, by a range of threats from climate change to an economic singularity or unfriendly superintelligence, are predicted. Taking a more cautious approach, respected futurist William Webb anticipates “not much change” in the coming decades as Moore’s Law plateaus and technological change slows and stabilizes.[4]

Serious commentators, including Stephen Hawking, Elon Musk and Bill Gates, are expressing both great anticipation and equal amounts of concern about some of these potentials. Both organizations and individuals should be aware of the trends and possibilities in order that we can collectively orient ourselves to shape the best possible future together.

The rapid changes in technology we are witnessing in our lifetimes form part of a broader historical pattern of technological progress. As we consider the evolution of the digital workplace, it can help to take a step back and consider where these changes fit as well as the forces influencing them. Crucially, this can help guide the strategies and business models we develop moving forwards.

Technological progress: K-waves and the long view

Russian mathematician, Nikolai Kondratiev (also sometimes spelled Kondratieff), working in the 1930s, found that economics could be explained by technology. He observed that technology evolved in leaps every 40–60 years. His work was taken up by economist Joseph Schumpeter, who named these leaps Kondratiev waves, or simply K-waves, characterizing them as a process of creative destruction caused by innovation that constantly revolutionizes the economic structure of society from within. Each K-wave is dominated by a new innovation that drives the economy, and each wave is generally thought to go through four stages: prosperity, recession, depression and improvement (see Figure 2).

A significant body of evidence has accumulated for K-waves, although the number, length, starting point and even existence of the cycles is a subject of ongoing debate among economists. Although statistics only enable the existence of K-waves to be tracked back to the start of the Industrial Revolution, historians have suggested that these cycles go back as far as the 10th century and the invention of paper and printing technology.

3

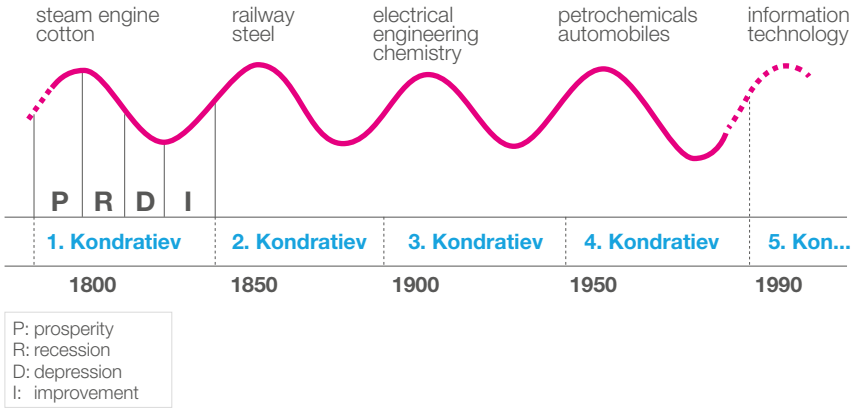

Figure 2: Kondratiev waves since the start of the Industrial Revolution (adapted from Wikipedia: *Kondratiev wave* – https://en.wikipedia.org/wiki/Kondratiev_wave).

At the start of the Fifth Kondratiev, information rather than energy took over as the source of growth powering the economy. This cycle was driven by the demand for information, communication and knowledge. In 1977, Marc Porat coined the term "The Information Age" to describe this current cycle.

Generally, it is thought that we are nearing or have already reached the end of the Fifth Kondratiev, but the basic innovation of the Sixth Kondratiev has not yet been identified, although there are certainly many contenders. Some think that the period up to the 2030s will be about the commoditization, optimization and modernization of the innovations of the earlier phase of the Fifth Kondratiev (i.e. computers, internet, phones, etc.).

It will come as no surprise to us that such a transition period has typically been characterized by volatility and disruption, as the ending K-wave is no longer able to support the economy and the new K-wave has not yet led to an upswing. K-wave theorists suggest that the new basic innovation of the Sixth Kondratiev may come in the field of healthcare and will emerge from biotechnology, nanotechnology, robotics, cognitive sciences and additive manufacturing. The end of a wave is characterized by investment in new technology and increased tolerance of risk, as technologies that may previously have been considered too risky become feasible.

"Disruption" and "accelerating change" are much-used phrases in most narratives about life in the early 21st century. Even a brief look at K-wave theory helps to provide perspective on this narrative. As workplace practitioners, this broader context is useful as we consider the impact of the current cycle on organizations as they strive to adapt to the changing environment and to innovate in order to retain relevance and thrive. Evolving the workplace, both digital and physical, is part of this process, with principles of democratization, decentralization, collaboration and communication key to successful organizations at the end of the Fifth Kondratiev.

3

As K-Wave theorists Nefiodow and Nefiodow (2017) put it: *"The new main task in organizational development can be expressed this way: information flow needs to be designed to enable as much creative, effective and efficient collaboration as possible."*

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4 Describing Digital Workplace 2030

The approach taken in this report to sketching out and bringing to life one possible vision of our digital future of work takes as its base Renaissance ideas of proportion and balance. Living in the first century BC, Roman architect, author and engineer Vitruvius published his treatise on architecture, *De Architectura*, setting out the core principles for creating buildings that are well proportioned, optimally arranged, enjoyable to inhabit, and fit for purpose.[5] It was his work that led to Leonardo Da Vinci's famous drawing of "Vitruvian Man", depicting the human body as a perfect geometric model for building (adapted for our cover image).[6]

While this may seem a rather fanciful and unlikely starting point for a description of our future digital workplaces, the notion of drawing on such principles as we set about designing these workplaces may help guide us to create digital worlds we actually want to inhabit and in which we will flourish as humans. Vitruvius advocated that, by adhering to these principles, spaces could be created that embodied "eurythmia" or the idea of a fundamentally good and pleasant environment in which human beings can live and work. In this way, the design of our physical and digital spaces support and even augment us as humans, in turn enabling organizations to be more productive, effective and creative.

Based on these ideas, we focus in on four dimensions of the digital workplace in 2030:

Dimension 1: Space

Digital Workplace 2030 is characterized by its inclusiveness as it breaks down boundaries of organizations, teams and industries to enable digital and physical spaces for frictionless collaboration, creativity and innovation.

Dimension 2: Capability

Digital Workplace 2030 is both immersive and pervasive, providing augmented workers and managers with on-demand capabilities tailored to their needs and preferences.

Dimension 3: Intelligence

Digital Workplace 2030 is the intelligence engine that powers a data-driven, fluid organization, shaping itself around the goals and needs of the market, the organization and its workforce.

Dimension 4: Beauty

Digital Workplace 2030 is beautiful in its experience, ethical foundation and purpose of enabling human development, wellbeing and fulfilment at work.

5 Exploring Digital Workplace 2030 dimensions

Dimension 1: Space

Digital Workplace 2030 is characterized by its inclusiveness as it breaks down boundaries of organizations, teams and industries to enable digital and physical spaces for frictionless collaboration, creativity and innovation.

What do we mean by "space" when we talk about virtual, digital worlds? Existing physically only in transistors, chips, sensors and other components, these are the spaces built and inhabited by the human mind and it is predicted that by 2030 most of us will have regular access to them. World Economic Forum forecasts suggest that 90% of the world's population will have regular internet access by 2024 (compared with 43% today).[7] As computing becomes ubiquitous, these digital spaces will increasingly take on a life of their own and start to blend with our tangible, physical world. In fact, the distinctions we currently make between physical and digital spaces will reduce as each flows and blends into the other.

Reinventing digital and physical space

Space is a critical dimension of Digital Workplace 2030, which speaks to how it will integrate information and bring people together, as well as disperse and dissolve the traditional boundaries we associate with work today. It will act in such a way that it will fundamentally change our ideas about:

- the digital and physical spaces we inhabit both at work and at home
- the familiar boundaries of organizations and teams
- the nature of collaboration and cooperation
- the gap between physical and digital reality.

In the second decade of the millennium, we are already feeling the impact of the digital workplace on the places where we physically work. "Anytime, anywhere" is the rallying cry of a new generation of workers no longer content to submit to a work scheme designed for the Industrial Age. Yet the trend is immature. Individual workers manage to find workable patterns and places of work beyond the traditional office or 9 to 5, and more progressive organizations help workers to do so, but this is not yet truly embedded in our work DNA. Those with the most flexible patterns can suffer isolation and a different kind of disconnection.

5

Campus working

By 2030, a mixture of necessity and creativity will have led us to a more optimal set of work spaces. These will be adaptable and hybrid spaces in the form of campuses, precincts and hubs that serve a range of purposes and organizations. They will be shared rather than owned. Creativity, innovation and community will be the watchwords for their design. Such spaces, the norm as we approach the mid-century, are just starting to come into being in 2018. In southern France, for example, “thecamp” is a futuristic hub for living and working that brings together people from different backgrounds, generations and professions to work on projects and grand challenges.[8] It describes its mission as enabling community members to:

- meet the most inspiring people in the world
- have the space and resources to complete their projects and pursue their dreams
- live in the future of technology and innovation.

Today, thecamp is an outlier but by 2030 campus working will have become common, also representing a more sustainable model for living and working. Not every campus will be a live-in community; different flavours will spring up, many around key population centres, offering a compelling range of facilities for individuals and families. They will represent a hyper-local, hyper-global mode of living and working that becomes the new norm. The workplace will shift from being a place that workers are forced to attend, to an attractive and inspiring place that is considered a perk and even a privilege. Such places will be key to attracting talent amidst a global shortage of qualified employees.[2]

Figure 3: thecamp.[8]

5

As computing becomes increasingly embedded in our environment, the workplace will be pervasive across connected homes, driverless cars (for some[9]), work campuses and a range of smart city spaces – when we want it. These spaces will increasingly support whatever it is we want to do, adapting to our needs to connect and communicate. As we see in Dimension 2, advances in virtual and mixed reality, as well as haptic technologies, will mean workplace experiences become less tied to desks and computers, as a personalized workspace can be constructed in any space.

Work–life harmonization will increasingly be a focus as the productivity impacts of stress and burnout, resulting from the "always on" connectivity of the first three decades of the 21st century, become glaringly obvious. Technology will both adapt to us and help us to adopt an optimal pattern of living as it aids us in monitoring our health and wellbeing. Organizations that allow customized work patterns and environments will be sought out by top talent.

Hyper-collaboration

By 2030, millennials will make up around 75% of the workforce.[10] This generation's propensity for collaboration and cooperation is already evident and, as this emphasis pervades the workplace, relentless collaboration will become the norm. Today's collaborative practices, such as communities, innovation jams, hackathons and idea markets, will become simply part of a day's work. Intrapreneuring will be highly prized as the digital workplace furnishes opportunities not only to suggest new ideas but also to bring them to fruition.

Outliers such as Google's "20 Percent Time" and Adobe's "Kickbox", both enablers of intrapreneurial spirit among employees, are already showing the way for companies seeking to reignite innovation in order to remain competitive. Just as innovation practices shift from add-ons to core practice, so collaboration will no longer be considered a nice-to-have but will be recognized as a key competence for organizations. Learning will be reinvented as part of this collaborative spirit, with peer learning and massive open online courses (MOOCs) key parts of the picture. Much learning will be delivered in-the-moment as it is needed, an early example of which comes from DAQRI[11], which can deliver information and learning overlaid on a worker's environment via augmented reality (AR) devices.

This emphasis on collaboration will extend the space in which organizations operate. The digital workplace, supporting this new mode, will extend within and beyond the organization, enabling new modes of collaboration. As organizations seek out new business models to survive in a period of market volatility, this will become the lifeblood of the organization.

5

Coopetition and new partnerships

Partnerships with other organizations will become increasingly common, even with competitors (so-called "coopetition"). Examples are already appearing, such as the Philips and Qualcomm Life collaboration to create a joint connected health offering.[12] Co-creation with customers will also be critical as consumers seek out ever smarter, more personalized services and products. Research and development will extend across physical and virtual labs, with researchers becoming hyper-connected and mobile, and an accompanying cross-pollination of ideas. Protecting IP and determining value will be key challenges amidst all this co-creation.

Boundaries between industries will diminish as companies move into entirely new fields.[13] Tesla is an early adopter in this respect as it extends beyond building electric vehicles into other industries with its energy storage products for the home and fleet of vehicles for self-driving ride-sharing – in other words, competing with incumbents across a range of industries.[14]

As the digital workplace reaches across these new partnerships and business models, knowledge will need to flow in a frictionless way. Connected spaces for collaboration will act as fluid containers that bring together workflow, people, content, conversations, data, ideas, transactions, pictures and applications around a particular need. This will replace the hard boundaries that make collaboration between and even within organizations difficult and siloed for many at present. Conversational interfaces will make interaction with these spaces more natural and intuitive.[15]

Conversation with a thought leader: Ryan Anderson, Teem

In reflecting on Dimension 1, Ryan Anderson, Vice President of Product Marketing and Workplace Strategy at Teem reflects: *"I'm a believer that we almost always think things will happen faster than they do. I'm reminded of futurist Paul Saffo's words: 'Never mistake a clear view for a short distance.' Some of these things will certainly happen in the next 12 years, but it's the complexities and interactions of the various elements that can slow them down."*

Ryan describes our future way of working as one of *"mixed presence"* that will increasingly happen across the digital and physical places created by organizations: *"Organizations will treat their real estate as places for gathering that are focused not just on collaborative work but also on expressing and nurturing the most important facets of corporate culture. In order to have access to the best talent, organizations may choose to hire someone who works in another city but that person in turn may need to spend several days a month at the corporate office. They'll do so not because they can't collaborate digitally, but because they wish to grow closer to the culture, and that travel is a sacrifice they'll be prepared to make in order to live where they'd like and yet be part of something bigger."*

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Touching on the intensifying competition for talent, he points out how the nature of the workforce will change, and as it does so, offering really enjoyable, attractive workplaces will be increasingly important: *"I'm seeing a lean approach to office work that's about eliminating redundancies and using a more contingent workforce. But retention will become even more important for organizations to maintain a healthy core of people in roles where they need continuity, perhaps as little as 20–40%, while the rest of the workforce is brought in more fluidly. The facilities will be critical to attract talent into the organization. Look at what Adobe and Plantronics have done in Silicon Valley, for example, creating really enjoyable facilities with a high level of cognitive comfort and camaraderie. They don't feel institutional, they just feel like places that you really want to be in. We need to see that happening in more places. There's only really a handful that are truly futuristic at the moment."*

Ryan brought our thought-provoking conversation about Digital Workplace 2030 to a conclusion by emphasizing the need for a purposeful and inclusive approach to both our physical and digital spaces: *"We need to think about inclusive or universal design that transcends physical and digital boundaries.*[16] *These are spaces that enable a seamless workflow for a diverse workforce with people of varying abilities, meaning that organizations can tap into the widest possible base of talented people, irrespective of where they are or whether they have motor, sensory or cognitive disabilities. There are some great things on the horizon from an inclusiveness standpoint.*

We also need to think about different scenarios; for example, three co-located people working with someone at home in Hungary and someone else in a co-working space in New York – how do we make sure that this is an equally inclusive, consistent experience for all of them? And, as robotics and AI progress, we also need to keep the focus on the importance of Emotional IQ in the future workplace. The roles where robotics and AI have the least likelihood of eliminating human talent are those jobs that require the highest amount of human-to-human interaction. Technology can augment our cognition, but humans are at our best when we seek to understand and work creatively with each other."

5

Dimension 2: Capability

Digital Workplace 2030 is both immersive and pervasive, providing augmented workers and managers with on-demand capabilities tailored to their needs and preferences.

Capabilities confined to only the most advanced digital workplaces in the early decades of the 21st century will become widespread in the 2020s and fundamentally reinvented by the early 2030s. A seamless suite of tools, including apps to support specific roles and jobs, dashboards that integrate business data into meaningful outputs, and chatbots using natural language processing, will all simplify interactions with information and people, thereby enabling work to happen more easily. The increasing capability and intelligence of the digital workplace will not only empower workers but also mean it does more of the work currently carried out by humans, leading to a reshaping of all job roles – something we explore further in Dimension 3.

From virtual to mixed reality

Capability will also extend beyond devices to the human body, and a workforce that is augmented with wearable and implantable technologies will emerge. While smartphones will have reached 90% of the global population by 2023[17], by the end of that decade they may increasingly be replaced by mixed reality (MR) and haptic technologies. Some experts predict that, by 2025, businesses will be investing in MR glasses instead of increasingly outdated mobile apps.[18]

Today, VR headsets, such as Oculus Rift and HTC Vive, are pointing the way for virtual reality, and applications are already found inside many organizations among manufacturing and field roles, for instance, at Boeing and DHL.[13] While VR is expected to dominate in the near future, and is likely to be adopted faster in coming years than any previous digital technology[19], it is MR that is likely to make the bigger impact in the workplace, with hints at this from the likes of Microsoft's Hololens, Metavision's Meta 2[20] and the ultra-secretive startup Magic Leap[21] all indicating what the longer-term possibilities might look like.

Some technologists predict a shift from devices that we carry to those that we wear – a move that will fundamentally change the capabilities available to workers[13] (see Dimension 4 for more on the demise of interfaces such as monitors that we take for granted today). Driven primarily by advances in gaming, VR and MR technology will bring changes to the workplace that seem distant today.

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Figure 4: Envelop – an immersive computing platform that enables the use of Windows applications in virtual reality (https://envelopvr.com).

MR glasses that are almost indistinguishable from ordinary glasses currently seem a way off when considering the clunky and tethered VR headsets of today. However, indications are that this is the direction of travel, with excitement around the work of startups such as Eyefluence (acquired by Google in late 2016)[22] and Magic Leap driving speculation in this area. This will revolutionize our interaction with the digital workplace. Instead of being attached to and hunched over screens and keyboards, the potential is for our personalized workplace to be superimposed on whatever environment we are within.

Imagine creating the number and size of screens you want, shaped to the task you are doing at that moment. Breakroom[23] and Virtual Desktop[24] are early iterations already available or in progress using VR, as is Meta's Workspace using AR.[20] Initially, such environments will mirror the office environments of today with their screens, keyboards and mice (just as our current digital environments mirror pre-digitalized work environments with their references to desks, paper and pens) but the potential for creative and diverse environments will be limited only by our imagination.

Touching the intangible

Developments in haptic technologies look set to provide us with new ways of interacting with the digital workplace beyond the mouse, keyboard or even the touchscreen. Interaction using wearables such as haptic gloves or without any equipment using ultrasonic "hotspots" in the air will enable interaction via gestures.[25] Early iterations such as Oculus Touch controllers[26], Meta's Airgrab[20], Gest Gloves[27] and Walt Disney's AIREAL[28] are already showing the way in this

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respect, demonstrating how workers might interact with the digital workplace – and each other – in VR and MR environments.

The human connection of face-to-face meetings will finally have become replicable in virtual environments. A virtual handshake using haptic gloves may not feel quite like the real thing, but it will bring colleagues and clients closer, along with the facial expressions and body language that enrich communication.[29] Recruitment and training are both areas that will be fundamentally transformed by MR. Early efforts today already indicate the rich possibilities, such as Intuit's VR experience for potential recruits to get a sense of its office culture, or Commonwealth Bank of Australia's use of VR to test candidates' decision-making capabilities or give them the experience of getting involved in a current project.[30]

Data that resides in a dashboard or deck will finally come to life as virtually assembled managers and employees will be able to step into the data and experience it in 3D, with new ways of visualizing and analysing data emerging from these kinds of capability. For workers wearing MR glasses, insight will be available as needed in a range of environments: from urgent communications while on the move, to client data during a sales meeting, real-time performance feedback while working on a project or real-time insight into how to optimize a workflow.[31]

While haptic technologies will enable familiar means of interaction in virtual or augmented environments, such as virtual keyboards or gesturing, completely new means of interaction will also be available in Digital Workplace 2030. Interaction via the eyes, already being pioneered by eye-tracking company Eyefluence[22] among others, and brain waves, with early work already being demonstrated by neurotechnology companies such as MindMaze[32], give a flavour of these coming possibilities. These methods of interaction will be simpler, faster and more powerful, although we may well anticipate them with some trepidation as the remaining gaps between our technologies and ourselves are steadily closed.

Wearable, implantable digital workplace

In these futuristic digital workplace scenarios, we can picture how the human body becomes liberated from some of the physical constraints and negative impacts of the current office setup. Instead of humans adapting physically to technology, the technology moulds itself around us. And meanwhile, the physical workspace could be the environment you're actually in – or it could equally well be a stunning beach or mountain vista.

Augmentation for employees in 2030 will not only involve MR and haptic technologies, but a range of wearable and implantable technologies that make future workers into cyborgs. Some companies are already implanting tiny microchips provided by Swedish startup Epicenter[33] into willing employees in order to facilitate access to buildings and devices, and to make purchases. Other augmentation possibilities are likely to include exoskeletons for heavy lifting, sensors embedded in clothes to monitor key health signals, and co-bots or collaborative robots to enable side-by-side working of humans and robots.[34]

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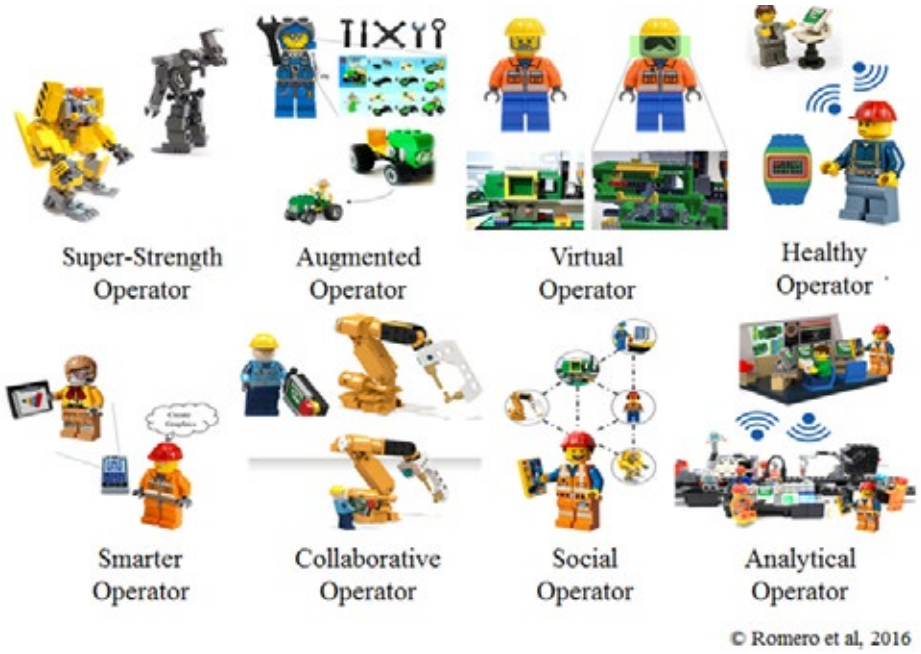

Figure 5: Ways technology can help workers.[34]

Workers will have access to a range of options for both cognitive and physical personal augmentation. This will raise questions around fairness in the recruitment and treatment of workers, with issues arising similar to those already seen in academia and sport.[35]

Workers with more fluid work patterns (see Dimension 3) will increasingly expect to bring their own digital workplace tools and technologies (BYODW) and to plug easily into the organization as they need and want to. The digital workplace as a service that is "on tap" will be common, accessed via a digital ID that workers use for a range of purposes. Thinking back to worker augmentation, many organizations are likely to use biometrics rather than passwords by 2025.[36] Personal digital assistants that can interact with an organization's digital workplace will be considered indispensable. These assistants will support workers by helping to optimize their decision-making, suggesting relevant options based on previous behaviour and working across channels to achieve desired outcomes (for more, see Dimension 3).

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Organizations up their Digital IQ

Critical to all this capability is the backbone in terms of not only of the foundational technology but also management practices, as organizations and individuals face a range of challenges relating to security, privacy and ethical use. As Gens X and Y take over leadership positions, a greater level of technological skill and comfort will pervade management. As increasing amounts of customer and employee data are collected, stored and analysed, building secure systems will shift from being a technology problem to a business problem. Partnerships between business and security will help develop strategies to mitigate attacks and respond quickly when they do occur.[37]

Digital mastery rather than digital literacy will become prevalent among the workforce, although, with the speed of new technology adoption likely to increase, addressing digital skills will be an ongoing area of focus. For instance, "automation literacy" – or how well a worker is able to nimbly integrate lightweight automation tools into their work – will become a key skill.[29] An organization's digital IQ will be a critical component of its performance. Questions will arise around who will train a workforce that is more fluid and less committed to a single organization (see Dimension 3), and less may be provided by employers.

Conversation with a thought leader: Pete Fields, Wells Fargo

While the potential capabilities of Digital Workplace 2030 are both extensive and exciting, Pete Fields, who leads internal digital platforms at Wells Fargo, also reminds us to focus on simplicity: *"The things that 'have legs' are often remarkably simple; they may not be complex or elegant, but they are really useful. For many, it's about being able to access people in an easy and meaningful way, making it easy for us to be connected, to check in with colleagues, to join a meeting, to reach out to someone. I'm interested to see what happens with video and whether it continues to surprise me. At the moment the form factor is so difficult; for instance, it's clunky and hard to search, and it's hard to consume when I commute, relative to other kinds of media."*

Reflecting on simple things that will make a big difference, Pete zooms in on access as a critical factor: *"We need to do accessibility much better; for instance, the system knowing when colleagues are accessible and reserving time with them when they become available. It's that notion of being able to access resources – whether these are people or information – when you need them. We struggle with that. Sometimes you know that the information or expertise is there but still have difficulty getting to it. One capability that checks both boxes of simplicity and access is bots. Bots are interesting – I think they could be like the next email, providing us with a familiar interface and human experience. They could change how we interact with digital workplace systems, whether we need to access a colleague or an HR policy. I'm intrigued by that."*

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He reminds us all to stay focused on the human and the individual as we reflect on our technological future: *"We continue trying to find business problems for technology to solve as it comes in from the consumer space and we try to apply it to work – often with limited success. It's tempting to over-generalize and think that one size fits all, that these technologies will be revolutionary for every role. The reality is that different personas need different things in their roles. Many of us come from a knowledge-worker perspective, and it's easy to assume that our colleagues do as well – that can be dangerous in terms of being relevant and making a difference to the whole enterprise."*

Pete also shared thoughts around some of the dichotomies of the future digital workplace, such as between integration vs diffusion, and information flow vs blocks: *"I've spent most of my career moving toward a more integrated platform but it's interesting to me that this isn't the way consumer experience has developed and that we're seeing some erosion of this in the corporate space too. It will be interesting to see whether it becomes more diffuse from a capabilities perspective in terms of tools that aren't integrated, because it's hard and expensive to do. It seems to be heading in the direction of employees using discrete tools to work on micro activities as opposed to a big platform.*

Another area that intrigues me is the idea of permeability of information and conversations. I'm not sure that translates well to the enterprise. A lot of organizations won't want that frictionless flow because of needing to control IP and customer data, as well as to consider risk management and privacy needs. In all of this, governance will continue to increase in criticality."

Finally, Pete reflected on the future of human connection as we move toward Digital Workplace 2030: *"There's a tight relationship between the desire for human connection and the need to engage with an organizational mission. I'm not sure how well we're accommodating that relationship. I see people struggling to maintain that human connection, and I'm not sure it's met through distributed workforces and technology and social networks. I have to wonder if we won't see a swing backward on that pendulum as organizations realize what they're missing in terms of human connection and what that brings to the workforce and how that engages them in the reason for being part of their team or larger organization."*

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Dimension 3: Intelligence

Digital Workplace 2030 is the intelligence engine that powers a data-driven, fluid organization, shaping itself around the goals and needs of the market, the organization and its workforce.

At the heart of the extended reach and expanding capabilities of Digital Workplace 2030 is its growing intelligence. Tesler's Theorem says that artificial intelligence (AI), or machine learning, is usually defined as whatever has not yet been done.[38] But, in reality, AI is already present in our lives and workplaces (albeit in rudimentary forms) – for instance, in the digital assistants on our smartphones, online recommendation engines, smart home technologies, supermarket inventory systems, Office 365 Delve and HR chatbots.

For now, these tools represent only "weak" or "narrow" AI, but "strong" or "general" AI is where the exciting, yet admittedly scary, potential lies. Large tech companies, such as Baidu and Google, spent between USD20–30 billion on AI in 2016, with 90% of this going to R&D and deployment, and 10% to AI acquisitions.[39] Experts differ on when the first truly artificial intelligence will emerge, some dating it to the 2020s or 30s, while others think the 2050s more likely.[33] Either way, growing AI capabilities will drive a number of key trends in the workplace, including:

- smart enterprises with data-driven decision-making
- a fluid workforce that reshapes itself as needs change
- pervasive measurement and insight on all aspects of work and the workplace
- hyper-personalized digital work environments
- data-driven behaviour change.

Against a backdrop of challenges, such as market turbulence, talent scarcity and environmental issues, the smart enterprise that can adapt and react quickly will be a necessity in the coming decades. The digital workplace will be not only a critical tool, but increasingly at the helm in enabling the organization's responsiveness.

AI in the boardroom

Today it is considered progressive for the C-suite to include a Chief Digital Officer, with just one in 10 organizations laying claim to one in 2017.[40] The World Economic Forum predicts that the first AI machine will join a board of directors by 2026.[7] Decision-making for this group will become data-driven, helping to remove bias and support rational choices. For all workers, routine decision-making will shift from humans to machines. Access to insights without trawling through a tangle of Excel spreadsheets and disconnected data sources will fundamentally change how key departments operate.

For instance, financial planning and analytics software, such as that provided by Metapraxis[41], is already bringing real-time analysis and predictive analytics to finance departments in large organizations and will provide decision automation

abilities in the near future. Such tools will be inherently more visual, enabling easier access to insight, especially when they are coupled with interrogation via natural language processing.

Voice-enabled virtual analytics assistant Rhizabot is an early example, enabling sales and marketing people to query enterprise data quickly and intuitively.[42] Another is x.ai, a personal assistant that schedules meetings for you.[43] Of course, AI tools are only as good as the algorithms and, by implication, those that design the algorithms. Potential issues around unintended bias, trust, accountability and oversight will increasingly need to be addressed.

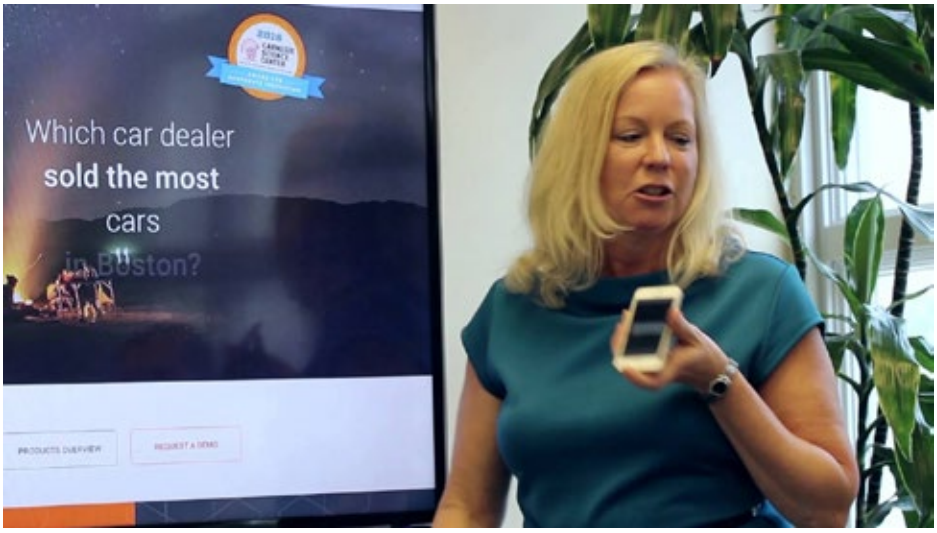

Figure 6: Rhizabot enables sales and marketing people with real-time insights.[42]

The American Productivity & Quality Center (APQC) has predicted six areas where cognitive computing (i.e. systems that mimic the functioning of the human brain through machine learning, data mining, pattern recognition and natural language processing) may be most useful for knowledge work[44]:

- **Search and discovery** – drastic improvements to search will be possible, providing employees with just what they are looking for, just in time and in relevant context.
- **Content curation** – there is potential to automate this by analysing sources and clustering them into groups that can be displayed both proactively and on demand.
- **Expertise location** – improvements in the quality of colleague recommendations will reduce time to find help and answers, while removing the burden of updating profiles.
- **Data-driven visualization** – this will be facilitated in new ways in order to explain, explore or exhibit data.

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- **Lessons learned analytics** – patterns and trends that highlight opportunities for improvement could be discovered from lessons learned databases and other project documentation.
- **Advanced personal assistants** – these could transform how employees access and interact with both knowledge and people.

While optimistic about these potentially transformational applications, APQC also highlights a number of challenges, such as the need for large data sets, skilled experts to train the system, high implementation costs in the foreseeable future, legal and privacy implications, and a major cultural shift required to adapt to such technologies.

As AI reshapes and in some cases takes over the functions of managers and workers from the boardroom to the frontline, societal debates about potential measures to address technological unemployment, such as the shorter working week, robot taxes and universal basic income, will need to accelerate. McKinsey & Company estimates that 60% of all occupations have at least 30% constituent activities that could be automated (see Figure 7).[39] This suggests a more nuanced story than the one told in the mainstream media of looming mass technological unemployment; however, at this stage, it seems inconclusive what the exact impacts will be as we move towards the mid-century. Organizations and governments need to start planning now for potential impacts.

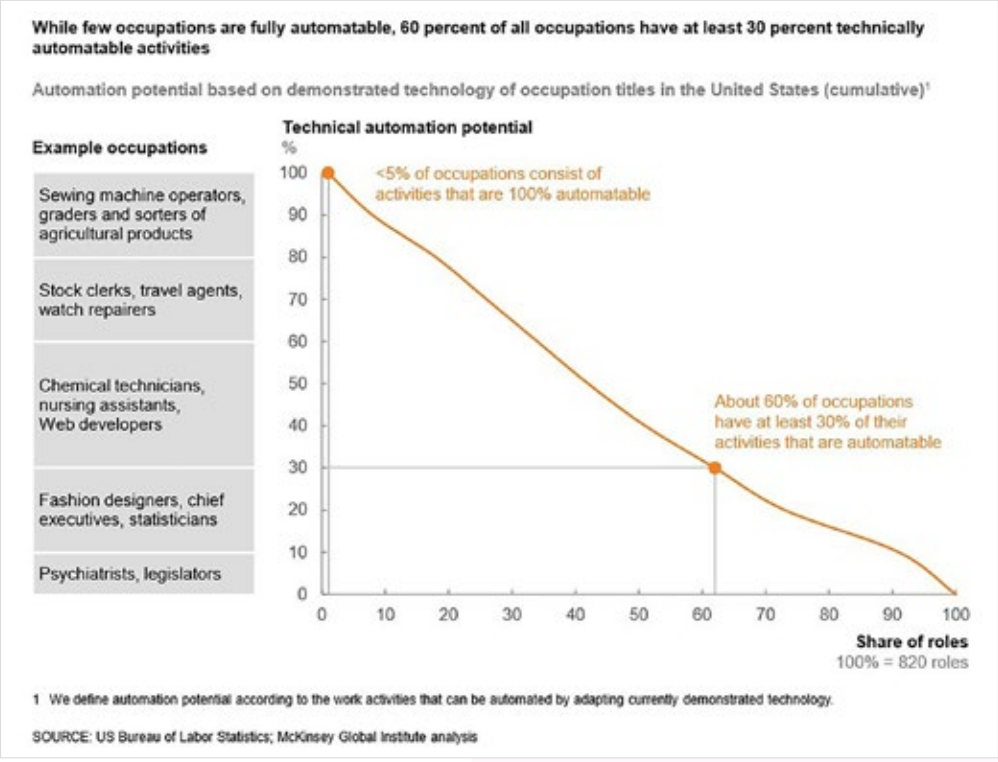

Figure 7: McKinsey & Company analysis on automation potential of all jobs.[39]

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Interestingly, rather than suggesting a future of human obsolescence, McKinsey & Company's analysis suggests that potential growth in global productivity due to automation (estimated at 0.8–1.4% annually) likely only results from the collaboration of robots and humans working together to produce the complex combinations of capabilities needed for most work tasks. The Institute for Future Studies, in partnership with Dell, has underlined this in recent research, in which it is argued that the 2030s will be all about human–machine partnerships that enable us to transcend our limitations and build on our strengths.[37]

The shape shifting workforce

At the core of the smart enterprise will be an increasingly fluid workforce. The digital workplace, connected up to the talent marketplace, will enable the recruitment and management of a workforce that is less fixed. HR teams are already starting to be assisted in recruitment and selection processes by AI applications that help to identify and screen potential applicants and reduce unconscious bias. These kinds of application will extend in the future, impacting all areas of recruitment, selection, onboarding and performance management. Already, the General Services Administration of the US Government has a chatbot called Mrs Landingham that helps to onboard new employees.[45]

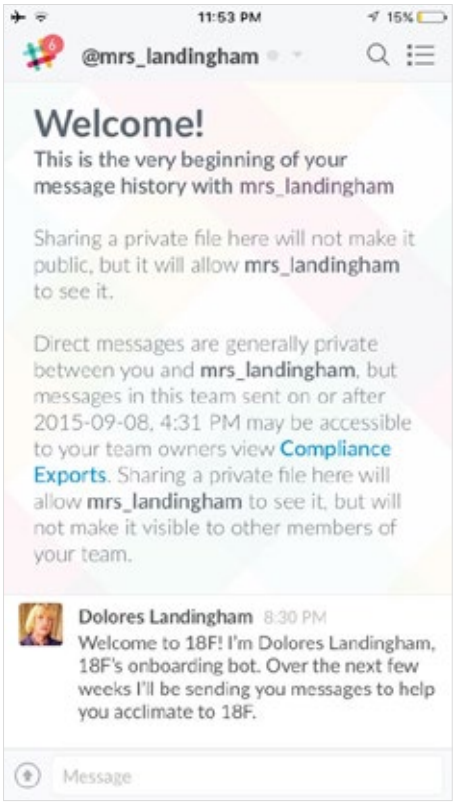

Figure 8: The General Services Administration's onboarding chatbot (from https://twitter.com/hillary).

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Teams that assemble quickly around projects and then disband at the end, in a cost-effective manner, will become commonplace by 2030. Blockchain technology may help to store all of an individual's employment credentials, meaning workers can be quickly authenticated and brought onto a project immediately, as well as facilitating fast payment. For instance, the Australian short-term work platform Chronobank is developing a blockchain-based financial system for freelancers, cutting out the need for traditional recruiters.[46] Already, around a third of companies say that blockchain is a current digital workplace investment priority for them.[47]

Following this rapid recruitment process, digital workplace tools will enable micro projects to be assigned and managed across distributed teams. These teams will have greater levels of autonomy than is generally seen today, self-organizing around projects and using smart actionable feedback to monitor progress and results.

Individuals with a portfolio of projects within or across organizations will stand out not only for their ability to produce results and collaborate relentlessly, but also for their personal brand and the network of talent they are connected into. In fact, organizations may hire networks of talent rather than individuals.[30] Reputation engines will help organizations to identify the best workers.

Increasingly, workers may self-select into projects or teams, a level of autonomy that will have a drastic impact on work engagement and passion. Competition with others for prized opportunities will help companies attract the best talent. However, where recruitment decisions become more and more the domain of algorithms using data from across a range of work and social resources, there may be a sense of diminished control among prospective workers as well as the potential for discrimination.[48]

Measurement becomes pervasive

Pervasive digital workplace measurement will bring both great opportunities for organizations and individuals, as well as related issues around the ethical use of monitoring and data. The breadth of data available will mean that performance can be constantly fine-tuned based on real-time analysis of key measures such as customer satisfaction and personalized performance feedback. Direct customer estimations of success and the value of products and services will be more readily available to help assess performance.

Smart teams may choose the data to measure themselves against, taking on greater responsibility for monitoring and results. This takes meaningful measurement to a new level as those closest to the work are able to self-monitor most effectively. Already emerging now in initiatives such as "results-only work environments", work will increasingly be measured by project success and deliverables rather than hours worked. Monitoring by managers is also being enabled in new ways; for instance, Veriato's software[49] monitors what workers do online and flags dips in productivity to managers, along with potential worker unhappiness, while Bluvision tracks worker location on site.[50]

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Questions need to be asked as to whether workers are empowered by these technologies or whether they represent an oppressive programme of control and surveillance. Digital Taylorism[51] is a real risk, meaning that, although our technology may advance, our business mindset may lag behind. Trust will need to be developed and employees allowed to opt out of schemes that monitor increasingly personal data relating to digital activity, physical location, health indicators and psychological wellbeing. Analysis of such data at an aggregate rather than an individual level, informing the overall performance of the organization, is likely to be better received early on.

An array of new industry standards, company policies, government regulations and social contracts will be needed.[52] These will also be needed to address issues such as how employment status and organizational or societal benefits are determined for a fluid workforce. Transparency and ethical use will become big issues as vast amounts of data collected can now be tracked, analysed and trended effectively.

Driving behaviour with data

Attempts to encourage behaviour change will be less hit-and-miss than in the early decades of the 21st century as data can be leveraged to drive better practices. An early example of this was Virgin Atlantic's use of customer and employee data to help drive behaviours that would lower fuel consumption, reportedly saving USD5.4 million at the end of the trial and also raising pilot satisfaction by 6.5%.[53]

This data will increasingly extend to emotions and sentiments, providing a much richer understanding of employee engagement and happiness than is currently possible, and moving from self-report to actual behavioural measures. As well as revolutionizing HR practices, this will also prove valuable at the intersection of customer and employee experience. Already, sentiments analytics companies, such as Rant & Rave in the UK[54], are helping companies to use real-time feedback to understand customer emotions and reactions, and to enable customer service staff immediately to understand their impact on customers, thereby gamifying customer service.

With all of this data and insight, the digital workplace will represent a hyper-personalized environment, which not only tailors content and services to the individual worker but also predicts what they will need next. Accenture describes this as the AI user experience in which AI acts as: curator (suggesting relevant options based on previous user behaviour); advisor (guiding the use towards the optimal outcome); and orchestrator (learning from past action and collaborating tasks across multiple channels to achieve outcomes).[55] Personalization will also go beyond just the content and services served up to the user to tailor the experience to the personality and work style of the individual worker.

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Conversation with a thought leader: Omar Divina, HyperScience

On the theme of Digital Workplace 2030, Omar Divina, Vice President, Sales and Customer Success at HyperScience, opened with a personal reflection: *"2030 feels incredibly futuristic although also not that far away. The last decade seems to have gone in the blink of an eye. When my 11-year-old was born, we didn't even have an iPhone; now I can do things walking down the block that I couldn't even imagine then. The pace of technology today is astounding!"*

Omar continued by reflecting on the opportunities for AI to help make business processes more efficient and automated, and ultimately to augment what humans are able to achieve: *"At HyperScience, our vision is to augment and automate as much of work as possible. At the moment, the focus is on leveraging narrow applications of machine learning to create practical and tangible value for customers; for example, by turning human-readable documents into machine-readable data. Many of the large enterprises that we work with are driving bold Digital Transformation and Innovation initiatives. But, if you "lift the hood" on the business processes that support these initiatives all the way up the value chain, there are usually quite mundane and antiquated processes that involve, for example, employees opening mail, looking at paper documents and entering them into a computer. What that tells us is that there's a huge opportunity to help organizations rethink where they can drive innovation and where they can optimize their business processes in a way that unleashes the value of the data they already have.*

"When I think ahead to 2030, our overall mission is to unlock new applications of human potential. If we can augment and ultimately automate certain aspects of work, then we should be able to find new ways to unlock human potential. It's really about growing and evolving the overall intelligence of an organization. By starting with turning human-readable documents into machine-readable data, we can then explore ways to augment decision-making through machine understanding in a way that is more effective and much less brittle than the rules-based systems we see today. We expect to see incremental changes in the ways that organizations automate and augment work, rather than sudden, sweeping changes that will eliminate entire roles or functions."

When talking about the future, he describes the process of adjustment that is needed as humans acclimatize to working more closely with technology and giving over some control to it: *"The best applications of AI in the enterprise keep a human-in-the-loop component that provides feedback to continually improve the models. This also allows people to make choices about how much of their experience they are willing to give up. I think about the adaptive cruise-control feature that I happen to have on my car: it can watch the car in front of me and control the speed based on that. However, there are moments*

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I've found myself instinctively applying the brakes or speeding up. It's taken time for me to feel sufficient comfort and trust in the vehicle's intelligence. Small changes in functionality – such as an email client reminding you to attach a document when you mention 'attachment' in the message – help us to make this shift. Admittedly, at first, that reminder felt slightly creepy but now I don't even think about it. I can focus on the content of the email and not worry about the particulars of sending it out."

Building on this theme, Omar talked about the uniqueness of being human as more work is automated: *"There will be a premium placed on all of the human characteristics that are difficult to approximate with a computer, such as empathy, creativity and curiosity, to name just a few examples. Organizations that recognize and harness these qualities, while also driving operational efficiencies and innovation by automating in other areas, will create powerful advantages and opportunities for the business. For example, on the people operations side, when it comes to the difficult and critical task of hiring the best talent, there are lots of companies taking a data-driven approach to recruitment by using AI and chatbots to find and screen candidates. However, I don't think you can automate away the final conversation that happens between the hiring manager and the candidate. In my experience, listening to my intuition and going with my gut, along with the benefit of data, usually leads to the best hiring decisions. In every case we'll need to find ways to work with the technology to make us better vs using it as a crutch."*

Bringing the conversation to a close, Omar balanced caution with optimism about Digital Workplace 2030: *"I think there's a big open question about what happens if organizations decide to take shortcuts by eliminating certain roles that are deemed no longer valuable, or by winnowing them down to a point where they're so augmented that the people in those roles aren't doing much of anything. That certainly is a pessimistic view. On the other side, my optimism is fuelled by the fact that we don't yet know what new roles might be created as organizations redefine what intelligence means for their business. New skills and experience will be needed for organizations to achieve their goals and differentiate themselves. There is the possibility, also, that we will see ways of leveraging skills that aren't particularly valued today but are specifically human. Overall, I believe that the future of the workplace will be hugely empowering for humans, far from the dystopian vision of an office full of automatons."*

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Dimension 4: Beauty

Digital Workplace 2030 is beautiful in its experience, ethical foundation and purpose of enabling human development, wellbeing and fulfilment at work.

One of the core Vitruvian principles of architecture – beauty – encapsulates both the visual attractiveness and the "pleasurableness" of a building, and this holds equally true for digital environments.

The path to beautiful, pleasurable digital work environments is one already being beaten early on in the century by a band of pioneering user experience (UX) practitioners. But whereas currently they constantly run up against walls in organizations when senior management do not fully grasp the importance or value of UX, this will be well understood by 2030. Humans adapting to poorly designed workplace technology, with the associated cognitive load and friction, will shift progressively towards technology that adapts to humans. As we have already seen in previous dimensions, this will include new, more natural, ways of interacting with it, such as by looking, speaking and gesturing rather than clicking and typing.

Ubiquitous user interfaces

Accenture predicts that by the mid-2020s screen interfaces will be less important and integral to daily tasks.[55] We will spend less time looking at interfaces and more time interacting with people and objects in the environment. Our digital experience will thereby become inherently more physical as "digital" starts to disappear as a separate notion. This has been described as the post-screen era, in which the user interface becomes ubiquitous.

Getting closer to the action, without the limitations imposed by our current interfaces, will enable capabilities we may only dream of now (as we saw in Dimension 2), empowering us to communicate ideas more quickly and vividly.[56] MIT and Carnegie Mellon are conducting research into "Tangible Augmented Reality", which will take over from the tangible user interface of touch devices and graphical user interface of computers.[57]

Multiple factors will help drive this shift:

- A fluid workforce with "on tap" access to multiple digital workplace environments will avoid organizations with poor experiences.
- Pervasive measurement will tell an unequivocal story about the impacts of poor experience on productivity and satisfaction.
- There will be a trend towards progressively less visible and intrusive technologies.
- Societal level concerns with wellbeing will help make stressful digital work experiences unacceptable.

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Design is likely to shift from UX designers to AI as it learns what good usability looks like and constantly adapts and tailors the digital environment for workers. It will take into account the particular psychological makeup of the user as well as the type of task being performed in order to optimize the experience. Under the guidance of machine learning, the interfaces we interact with will achieve a level of perfection previously unimaginable. Ironically perhaps, machine-designed UX will make the digital workplace more human than ever before. Poor experiences will be a critical issue for organizations as technology becomes much more integral to the human experience – these will be felt more viscerally, creating a jarring and unpleasant effect far beyond the frustration they cause today.

UX professionals, far from becoming redundant, will be the artists and storytellers of the digital age, crafting the narrative behind these tools. As the interfaces and devices we know today disappear, designers will be freed from designing within the limitation of boxes and buttons.[58] Design may become a more holistic discipline as deep understanding of both digital and physical worlds is needed to craft satisfying experiences.

Health, wellbeing and happiness

Aesthetically beautiful, immersive digital work environments that match and blend with the attractiveness of the new campus or hub environments in the physical world will be the result. These will not only enable workers to get the job done in an optimal way but also help the worker to maintain optimal wellbeing. For a workforce increasingly concerned with health, wellbeing and happiness as measures of a life well lived, this will also be a key employer attractor. With millennials reportedly much more clued in to health issues and staying well than previous generations[59], ignoring this area will simply not be an option for organizations. This will drive digital workplace innovations that connect up with health and fitness apps to support employees in achieving their health goals.

Psychological as well as physical health will be a priority for workers. As humans struggle to psychologically adapt to the vast technological changes since the turn of the century, the negative effects of cognitive overload will force designers to find solutions to deal with attentional issues. The seeds of a movement of mindful or quiet technology have already been sown and are starting to produce technologies that help limit distraction and minimize addiction. Immersive environments will also bring dangers of illusion and potentially losing touch with reality, which will need to be addressed.

Such efforts will move from the fringes to the mainstream for digital design teams and could potentially be an area where workplace rather than consumer technology could lead, with productivity goals driving investment in new techniques. Environments that are responsive, not just to emotions, but also to technology habits, patterns of work and stress, will be able to help nudge workers towards healthier and more productive modes of working.

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Ethical, sustainable environments

Beauty goes deeper than the surface and no matter how delightful the digital environment of work, it will not be considered truly beautiful unless its powerful capabilities are applied in an ethical manner. Organizations will need to move to address ethical and moral questions arising from Digital Workplace 2030 with its capacity for monitoring, measuring and influencing workers. Roles will be established and industry bodies will help organizations to navigate difficult areas.

Teams leading on the future digital workplace need to start considering a range of ethical questions[60]:

- Will organizations invest as much energy in ensuring that the digital workplace supports employees to flourish as they do in optimizing productivity and efficiency?
- Will real relationships between humans (e.g. manager and employee) be enhanced or diminished when intelligent assistants take care of much of their communication?
- Will we be able to tell the difference between human and intelligent assistant communications?
- How will organizations decide which internal functions/capabilities should not be automated (e.g. a performance review, a recruitment interview)?
- How will organizations make the most of the IoT without imposing undue surveillance on employees?
- Who will be accountable when “black box” algorithms or intelligent assistants get it wrong?
- Will wearing mixed reality glasses, or having a biometric implant, be optional or a condition of employment?
- What is the potential for AI to result in human deskilling?
- Will cognitive underload replace cognitive overload as a key issue for workers, as more of their tasks are automated?
- Will workers become dependent on AI and less able to solve problems and make decisions?
- How will leaders know if the decisions made or suggested by AI are correct or the best ones?
- What is the potential for discrimination with machine-mediated decisions on recruitment or promotion?
- Should companies that automate away human jobs be subject to a “robot tax”?

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- Will leaders and employees still be able to make decisions if they go against the AI recommended route? Are there decisions only humans should be allowed to make?
- What new policies and guidelines will companies need to govern the use of the digital workplace?
- At what point does personalized content and information become subject to the "filter bubble effect" in which employees do not get the full picture?
- What happens if employees' IDAs are hacked or manipulated into divulging confidential information or taking an inappropriate course of action?
- Will exploration, serendipity, reflection, intuition (etc.) still be allowed a place in the fast-moving digital workplace of 2030?
- How will we identify and evaluate the assumptions, ideas, biases and values that are built into our digital workplace tools by the companies who create them?

The potential to free up human cognitive effort and time through enhanced digital workplace technologies presents challenges, not only in determining how to have a fair and stable society, but also in determining how people will use this new leisure time. Experiments such as the six-hour working day in Gothenberg, Sweden will be important to determine how this will work and to reveal potential societal impacts.

Digital renaissance of work and society

Beauty in the digital workplace echoes the original Renaissance concept whereby beauty entails a rich, pervasive and encompassing approach to life, far beyond the "mere" superficial modern interpretation of the term.

And equally so in this second renaissance – the Digital Renaissance. In our fourth dimension, beauty inhabits and infects all the pores of the experience of work – including what work means, brings and enables in human existence.

Beauty here reflects a work ethic, which we called the "digital work ethic" in our book "The Digital Renaissance of Work".[61] In this ethic, the beauty derives from how we experience work: the pleasure, reward and value it brings to our lives. Work has already in 2017, and will fully by 2030, have transformed itself in most cases and for most humans from drudgery, obligation and suffering to fulfilment, enjoyment and meaning. Perhaps not wholly, but predominantly.

As Seth Godin, digital marketing sage, says: we will all have become artists and artisans in our work.[62] This can already seem viable when applied to knowledge work but the shift will pervade most work by 2030. Beauty in this digital world will act as an atmosphere sweeping through work and its role in our diverse societies.

5

Conversation with a thought leader: Dan Mullis, Adobe Systems

"It's not just about the space, and it's not just about the technology. Beauty in the digital workplace is the result of the thoughtful pairing of the two." Adobe's Head of IT Collaboration Services, Dan Mullis, spends his days working to perfect that thoughtful pairing to create pleasurable and productive spaces across the company's many global office locations. This, itself, is a collaborative pairing between IT and Facilities, partnering to provide a great experience for Adobe employees.

With this opening reflection, Dan set the tone for a conversation focusing on beauty as a characteristic of meetings being able to happen with greater ease, passion, continuity and connection, all helped by the technology of the digital workplace. *"We already build today for the planned conversations (staff meetings, one-on-one meetings, daily stand-ups, etc.), but we're also constantly striving to give people opportunities to continue valuable unplanned conversations. A passionate exchange over lunch could turn into the next great feature or product. If we can facilitate the continuity of those conversations and take the rigors of meeting and room scheduling out of the equation, then we're doing the right thing. Our goal is to provide our employees with the necessary space and tools, empowering these types of timely conversations."*

Figure 9: Adobe employees can exchange ideas or simply say hello at the always-open "wormhole" that connects lobbies (or common areas) in their San Jose, California and Lehi, Utah offices.

5

Dan goes on to explain how these types of conversations are being enabled at Adobe: *"When traveling, I generally have many arranged meetings. At Adobe, we recently opened a video link – we call it a 'wormhole' – between our headquarters office in San Jose and our large Utah campus. What started out as a curiosity has become a touchpoint for the kind of impromptu conversations among colleagues in different locations – with the Rocky Mountains and a California sunset serving as inspiration for new ideas."*

In contrast to those "off-the-cuff" conversations, Dan also touches on how he thinks the experience of scheduled meetings might change in the future: *"The real power of the thoughtful pairing of space and technology comes when it feels like meetings just happen and participants can get down to business quickly and efficiently – with video connectivity at the tap of a screen; collaborative document sharing that is both interactive and accessible; all in an environment that breaks down the barriers that result from people working in different corners of the globe."*

In addition to physical spaces and tools in the digital workspace, Dan takes a closer look at the technology of the future by sharing some insights into the role functionality and beauty will play: *"Some people are designing technology that ticks all the functionality boxes – but I'll take less functionality for a seamless, frictionless experience. That frictionless part hasn't been nailed yet. Thinking back 12 years, I could get to and share all the information needed from my laptop but it was clumsy – and today, while improved, it remains clumsy! That will be different 12 years from now."*

Dan concluded with a reflection on how we will interact with Digital Workplace 2030: *"We will all gravitate to frictionless spaces that have been designed to adapt to our needs, bypassing spaces that generate cognitive load."*

6 What do organizations need to think and do now?

Looking ahead enables us to map out potential scenarios in order to help better guide our actions in the present. Analysis of what the "World's Most Admired Companies" do differently has shown that they consistently focus on the long term, balancing the demands of the moment with future business needs. The changing nature of work is identified as a critical aspect of this long-term focus and planning.[63]

For digital workplace leaders asking what they should do now to prepare for the workplace of the coming decades, here are a number of recommendations and thinking points:

1. Stay focused on strategy

New technologies arrive from the consumer space with no small amount of hype; so, digital workplace practitioners should be ready with a robust digital workplace strategy focused on business goals and employee needs. This enables experimentation and adoption of new tools to be driven by needs rather than the latest "shiny new thing". The strategy should include a clear approach and criteria for evaluating and integrating emerging technologies. The four dimensions of Digital Workplace 2030 can be used to assess plans and progress against likely future developments. Mapping out future scenarios will need to involve a cross-organizational group so that the potential of emerging technologies can be understood in concert with, for example, an increasingly fluid workforce and more agile approach to real estate.

2. Head off concerns

The technologies that promise to dominate the future digital workplace come with a host of concerns relating to risk, security, privacy, confidentiality, regulations, etc. Digital workplace practitioners need to open the dialogue early on, seeking input from areas such as risk and compliance, in order to avoid progress being hampered further down the road. Doing so will ensure that concerns are properly considered and addressed, and demonstrate to key stakeholders that due diligence is being done. This dialogue should extend to the ethical questions highlighted in this report, with a cross-organizational group needed to discuss and understand the issues and recommend an approach. Although some of these questions may seem far off at this point, the sooner organizations can gain clarity on the implications, the better prepared they will be as new capabilities continue to arrive apace.

6

3. Start to experiment

While large-scale implementations of, for instance, cognitive computing systems or augmented reality applications may be some way off, organizations are already starting to experiment with these technologies. Oxford Economics found that many organizations expect emerging technologies to become investment priorities in 3 years' time, including: big data/analytics (34%), Internet of Things (36%), 3D printing (28%), augmented/virtual reality (19%), AI/machine learning (30%), and robotics (27%).[47] Developing proof-of-concept examples is critical to get beyond the hype of emerging technologies and to understand how they can be integrated into business goals and processes. This may involve identifying areas of the organization with a particular need that can be met by these tools and which demonstrate readiness to adopt them. It is important to define metrics for such experiments so that effectiveness can be assessed and measurable wins demonstrated.

4. Understand employees

The promise of emerging technologies for digital work can only be truly realized if based on a thorough understanding of how employees work on a day-to-day basis in different roles and parts of the organization. Grounding conversations about future scenarios and capabilities in user personas validated through research will help to ensure that experiments are focused on real needs. As organizations map out what the composition and capabilities of the future workforce should be, personas can help to bring to life future needs and use cases. As the workforce becomes increasingly multi-generational, a critical aspect of this will be understanding the needs, motivation and attitudes of different generations of employees in relation to the digital workplace, and managing their expectations.

5. Focus on skills

As emerging technologies progressively make their presence felt inside the enterprise, organizations will need to continue to raise their digital IQ. As well as involving the range of skills (e.g. operational, critical, creative) needed to use the technology as intended, and with a degree of cognitive ease in order to be productive, this also means placing the emphasis on skills and traits that increasingly smart systems cannot replicate. For instance, emotional intelligence, critical thinking, adaptability, creativity and curiosity should all be nurtured within the workforce. At the leadership level, this means helping current leaders to grow their digital skills and shift to new mindsets, as well as preparing a pipeline of future leaders with the capabilities that will be required in Digital Workplace 2030.

6

6. Consider the cultural shift

Learnings from technological shifts in the last decade, such as around mobile and social media, will provide digital workplace leaders with rich insights into the importance of cultural context and change management for successful adoption of emerging technologies. However, if these lessons have not been taken on board, challenges relating to employee acceptance or resistance to new tools could escalate as they have an increasingly deep impact on the nature of work and jobs. Shaping and fostering a culture that is conducive to the adoption of tools such as personal digital assistants and chatbots should be a critical focus for leaders at all levels of the organization.

7. Tell a story

Digital workplace leaders, as well as those in areas such as HR and real estate, need to weave a compelling and convincing narrative around the changing nature of both the physical and digital workplaces. This needs to emphasize a future in which humans work ever more closely with machines, rather than one which entails a battle between humans and machines. This needs to be a two-way dialogue that enables leaders and employees to familiarize themselves with the opportunities and challenges relating to the future of work, as well as discuss and help determine how the organization approaches it. Stories of successful adoption of proof-of-concept experiments from early adopters will help to bring the narrative to life, making it real and tying it back to individual employees' daily work lives.

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9 Acknowledgements

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Paul Miller is CEO and Founder of the Digital Workplace Group (DWG). His latest book, "The Digital Renaissance of Work: Delivering digital workplaces fit for the future" (co-authored with Elizabeth Marsh), was shortlisted for the CMI Management Book of the Year 2016 Award. Paul's previous book, "The Digital Workplace: How technology is liberating work", helped to popularize and explain the term "digital workplace". Paul has given many inspirational talks on the digital future of work for audiences at Microsoft, IKEA, Google, Accenture, Harvard Business Review, Cisco, European Commission, Adobe and Oxford University.

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Elizabeth recently co-authored "The Digital Renaissance of Work: delivering digital workplaces fit for the future" with DWG's CEO, Paul Miller, which provides a roadmap for digital workplace practitioners. She regularly blogs and speaks at industry events.

Elizabeth brings over 10 years of experience in the fields of intranet and knowledge management to her role in DWG. Her career has included intranet management roles at T-Mobile and Reuters, with broad-ranging responsibilities including community management, internal communications and research.

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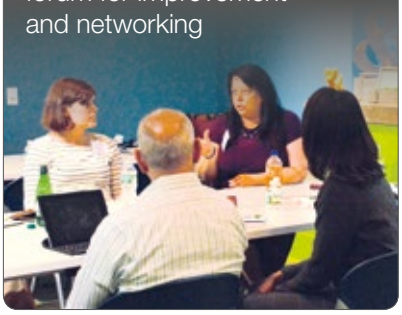

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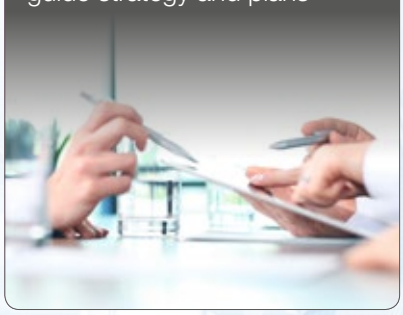

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Estée Lauder

An expert partner to transform your company's workplace

DWG is the leading long-term strategic partner for large enterprises globally – covering all aspects of the evolving digital workplace industry – with services grounded in vendor neutrality, practitioner-led expertise, data, metrics and research. To get started, contact DWG through the options on the next page.

Sample members and clients

3M, IKEA, The Coca-Cola Company, Adobe, ExxonMobil, McKesson, verizon, conEdison, UNHCR The UN Refugee Agency, EY, at&t, ING

Overview of Services

dwg Digital Workplace Group

Don't journey alone

Independent expertise for intranet and digital workplace success

www.digitalworkplacegroup.com

How do Digital Workplace Group's three services advance your workplace?

Member Forum

Confidential learning, ongoing improvement

The DWG Member Forum is a confidential, members-only group. Membership combines online and in-person peer learning with expert research and practical insights into how others have solved challenges, based on more than 700 evaluations of major organizations.

Peer learning
Rich interaction and sharing with teams from other major organizations

Expert research
New members-only reports every quarter and a vast archive of papers and videos

Members-only events
Live online Q&As with experts, research-driven webinars, member meetings onsite at your company, and more

Annual Benchmarking

Strategic evaluations, baseline performance measurement

DWG Benchmarking provides in-depth analysis of your sites and/or digital workplace environment, and comparison with other similar organizations. You can choose to benchmark your:

Intranet

- Usability
- Strategy & Governance
- Metrics & Performance
- Communication & Collaboration

Digital Workplace

- Cultural Readiness
- Workplace Maturity

Consulting Services

Strategic interventions, discrete projects

DWG Consulting Services provides vendor-neutral, unbiased, high-quality advice and practical hands-on support for digital workplace and intranet programmes, such as:

What does "good" look like?
External insight into industry best practices – to inform strategies and plans

Define vision, strategy & roadmap
Methodology and expertise to establish the road ahead

Facilitated workshops
Engage stakeholders across a global organization or within a function – so the whole team starts on the same page

Why do so many leading companies choose Digital Workplace Group?

Large company expertise: We've worked with Fortune 1000 / FT 500 (and comparable) organizations for more than 15 years. Our expertise and insights focus on the successes, challenges and needs of such major organizations.

Measurement and research focus: Our consulting and evaluations rely on measurement derived from more than 700 benchmarks and our robust research programme, to provide a unique reservoir of statistics and case studies. We provide "data and metrics in a world of opinion".

Real-world practitioners: Our benchmarkers and consultants have previously managed intranets and digital workplaces at major organizations. Our expertise is rooted in experience.

Independence: All our work is vendor neutral and our consulting and evaluation framework is proudly technology agnostic.

How to contact DWG

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