



The Future of Work and Reimagining Displays for the Industry 4.0 Era

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Executive summary

With increasing digitalization and mobility, the realms of work-live and play continue to converge. The concept of work and how it is done is also changing, creating the discussion around the **Future of Work [FOW]**.

IDC defines the FOW as the application of new talent management practices along with 3rd Platform technologies and innovation accelerators, such as augmented reality/virtual reality (AR/VR), artificial intelligence (AI), and Internet of Things (IoT), to fundamentally change the concept of work and how it is done. It is a holistic strategy that aims to leverage digital technologies, attitudes and behaviors to reinvent the way businesses engage with their employees, partners and customers to drive higher efficiencies and deliver superior experiences (than just products or services) that result in sustained competitive advantage.

This IDC InfoBrief, sponsored by Dell, outlines the key trends and priorities around FOW with a specific focus on displays. **It also explains how displays are a critical component today for delivering superior experiences** as well as for improving productivity and collaboration in the increasingly digitalized world. And to meet the FOW demands and prepare for the Industry 4.0 era, IT and business decision-makers need to rethink their display and monitor strategies.



Rise of the digitalized economy



BY 2021, at least **50%** of global **GDP** will be digitalized, with growth in every industry driven by digitally enhanced offerings, operations and relationships



This is the ticking clock that is (or should be) driving every organization to move quickly along its digital transformation (DX) journey. Organizations that are slow to digitalize their offerings and operations will find themselves competing for a progressively shrinking share of their market segment's opportunities. The time frame is short: organizations must make significant progress in transforming to a digital native model over the next three years.

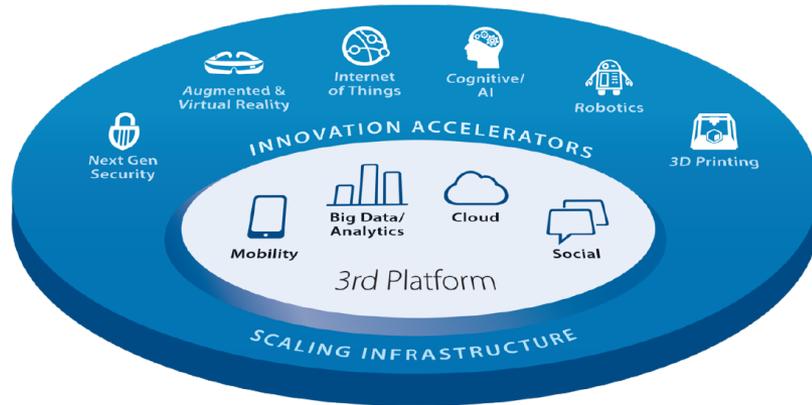
DX is profoundly impacting all facets of our life, both personal and professional. DX is as much about technologies and new processes as about empowering employees to excel at their work.

In the DX era, employees are working with a lot more content, videos and data, and they need better **tools and displays** to feel empowered at work.



Rapid adoption of emerging technologies impacts even displays

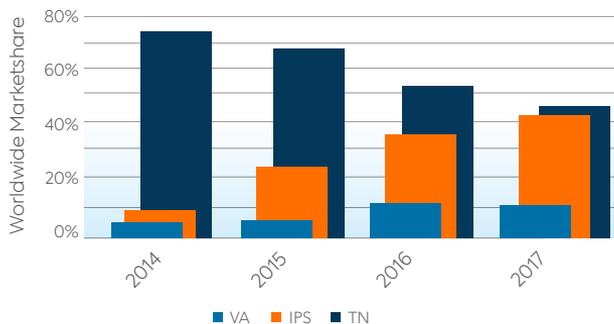
By 2021, new 3rd Platform technologies, including AI, AR/VR and IoT solutions, robots and drones, and 3D printers, will account for almost a quarter (**23%**) of total ICT spending. The fastest-growing technology markets last year were AR/VR, cognitive and AI, and 3D printing and robotics.



To cater to the new demands arising from the use of emerging technologies, the display market in the last few years has experienced significant innovation in terms of richer resolution and colors, form factor and interactive capability.

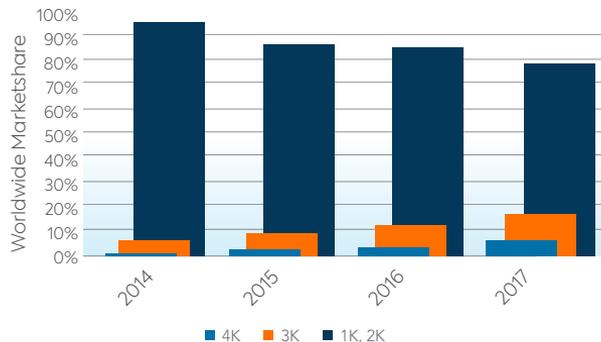
Enterprise preference for displays over the years has tilted in favor of richer, higher resolution displays

% of shipment by panel type



The dramatic shift from twisted nematic (TN) to in-plane switching (IPS) and vertical alignment (VA) has indicated end-users' preference for a better visual experience, as IPS and VA provide better color reproduction and viewing angles.

% of shipment by resolution for monitors >23in.



The modern worker is dealing with more data and denser workloads than ever before. The rise of quad-high definition (QHD) and ultra-high definition (UHD) monitors allow him or her to pack more information on one screen than a typical Full HD (FHD) monitor.



IDC expects the monitor market to increasingly shift toward IPS as well as accelerated growth of advanced resolutions. As such, the visual experience continues to evolve towards better color and definition.

The growing diversity of devices and platforms in the workspace is creating interoperability and management challenges

IDC EXPECTS THE DIVERSITY OF DEVICES IN ENTERPRISES WILL CONTINUE TO GROW.



The consumerization of technology has put pressure on IT departments to keep up with employees' desire for more flexible device policies.



In response, many organizations have created bring your own device (BYOD) or choose your own device programs. This has spurred an influx of disparate devices, form factors and platforms creating unprecedented interoperability and management challenges.



With all the diversity, employees today often struggle with different types of ports and power cables, creating more clutter in the workspace and adversely impacting productivity and collaboration.

So, what does the Future of Work entail, and what does it mean for displays?

THE FUTURE OF WORK WILL INCREASINGLY BE ABOUT DELIVERING SUPERIOR EXPERIENCES TO BOTH EMPLOYEES AND CUSTOMERS

IDC Future of Work Framework: The 3 Dimensions

The **workspace** of the future will increasingly be anytime, anywhere, and will include a mix of the physical and virtual realms to deliver seamless experiences.



The **workculture** will be even more borderless, collaborative and innovation-focused, and offer more fun and freedom to employees.

The **workforce** of the future will increasingly be distributed, with intelligent machines and humans working together cohesively.

We are witnessing the rise of digital experiences even at physical touchpoints, as the line between the digital and physical worlds continues to blur.

Displays and monitors will remain the primary gateway to these digital experiences for viewing, interacting and creating digital content, for both employees and customers.



Better displays unlock interactive AR/VR experiences for employees and customers

The worldwide market for AR/VR is expected to reach **US\$209 BILLION BY 2022 FROM JUST US\$14 BILLION IN 2017.**



AR/VR is proliferating across sectors



Virtual fitting rooms in retail stores



AR/VR content-creation in gaming



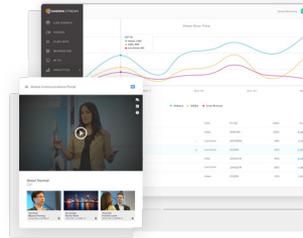
VR training



VR design and architecture



Interactive displays in public spaces

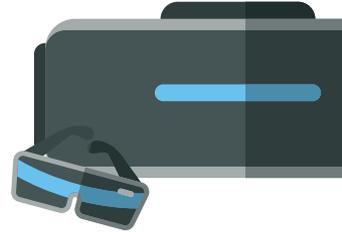


Case Study: Sherpa Digital Media

US-based Sherpa helps top movie studios and Fortune 500 companies to create, manage, deliver and analyze 8K, 4K, 360-degree and AR/VR digital content via its Sherpa Stream video platform. Sherpa worked with Dell to create a custom appliance and monitor to deliver immersive, jitter-free content for its clients.

Although headsets are the primary interface for AR/VR, several use cases such as VR training, content creation, and design and architecture applications require multiple users to view and edit the AR/VR content which is not possible on headsets. Consequently, enterprises require larger monitors to create and display content, and to offer truly immersive experiences to both employees and customers.

Even for AR/VR headsets, it's still early days as issues such as jitter and pixilation remain. Therefore, advancements are being made in displays and new optimization techniques are being developed to deliver better interactivity and immersion.



Immersive technologies are enhancing collaboration and productivity for globally dispersed teams, increasing the need for high resolution displays

RISE OF BORDERLESS ENTERPRISES

Today, teams are structured regardless of location, time zone or travel time. It's all about finding the right skill and talent wherever it is available and making it possible for globally dispersed teams, and ecosystems to collaborate, utilizing the latest and best tools.



CASE STUDY: FORD VIRTUAL REALITY LAB



Ford designers, engineers and researchers are collaborating to create vehicles in a new and advanced way at their Virtual Reality Lab – with UHD and VR technology.

The facility enables employees to experience a design concept before a physical prototype is produced to evaluate materials, colors, aesthetics, as well as ergonomics. Although only two employees are immersed in the VR environment at once, teams in Ford centers in Australia, Brazil, China, Germany, India, Mexico and the United States of America can see the live feed on UHD screens, collaborate and provide feedback.

VR and UHD are driving collaboration between globally dispersed teams

Improving collaboration is a key focus for enterprises today to break silos: Smart monitors with interactive features can turn any communal space into collaboration hubs

IDC is seeing growing interest in unified communications and collaboration solutions among customers across all business segments. This is being driven by advances in technology and more deployment choices, and the growing interest in cloud, mobility and collaboration solutions — to accelerate DX.

In recent years, demand for open collaborative spaces and meeting room displays has been growing, to drive innovation and cross-team collaborations.

Real-time communications platforms facilitate embedding voice, messaging and video into software for cost-effective, flexible and agile cloud-based communications.



IDC predicts that by 2020 more than 50% of enterprises will leverage communications platform as a service (CPaaS) to implement real-time communications application program interfaces (APIs) for customer service, collaboration and message notification applications.



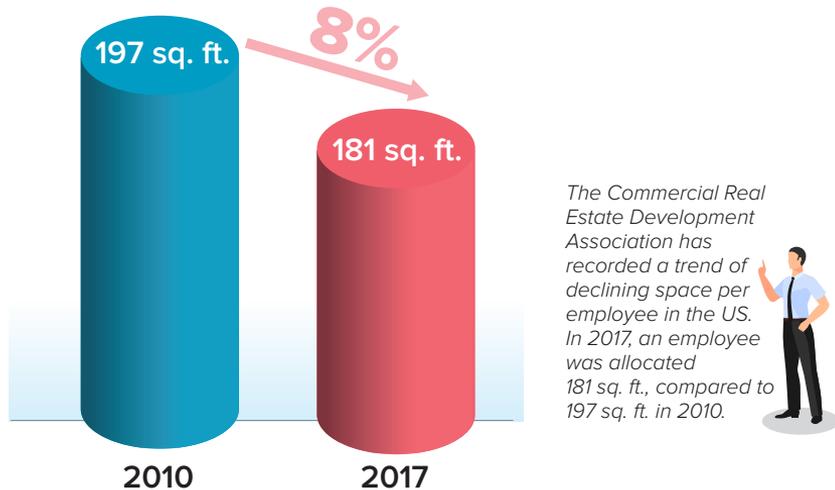
Smart monitors with integrated voice-over-IP, high-quality sound and touch features turn any communal space into smart meeting rooms.



Cognitive interfaces and AR/VR technologies are making meeting room monitors more interactive and easy to use, improving employee experience and productivity.

Workspaces are adapting to the new collaborative work culture and cost-efficiency drives: Displays need to cater to space constraints without compromising on design and screen real estate

US OFFICE SPACE/EMPLOYEE CONTINUES TO SHRINK



Shrinking office space means there are more employees per square foot of office space, and **less desk space per employee**. This implies new displays should include **form factors and sizes that cater to both space constraints, flexibility and modern design requirements**. Today's displays have a smaller base, and are ultrathin without compromising on the amount of screen real estate and resolution.

Globally **17,000** coworking spaces and **1.7 million** people will be working out of coworking offices in 2018, up from just 43,000 in 2011.

The real drivers for coworking are not just cost savings and easy flex-up, flex-down for office space and facilities. The new fun@work culture, **innovation, talent attraction** and **retention** are the key tenets for this growing trend.



Due to the rapid growth in hotdesking, coworking spaces and modern open-layout offices, the compatibility of devices with multiple platforms and meeting-room applications is becoming an extremely critical factor for improving productivity and collaboration.

Displays are enjoying a design renaissance to offer more visual real estate and meet aesthetic needs, while curved monitors deliver immersive experiences

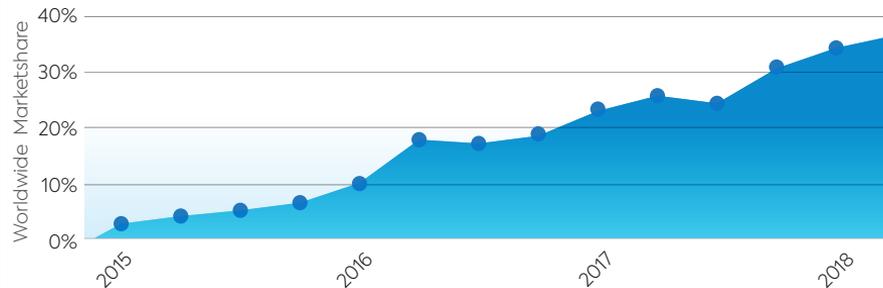
Not only have shipments of >27in. monitors grown 40% CAGR in the last three years, but new screen sizes continue to be added



Over the last few years, the emergence of extra-large (>27in.) and ultrawide (21:9 and 32:9) monitors has enabled new avenues of collaboration and productivity. Extra-large monitors allow for multiple users to share the same view seamlessly, improving productivity and collaboration.

Monitor designs from ultrathin to ergonomic base consider the needs of today's workers and offer better viewing experiences. Curved and ultra-narrow bezels provide a sleek and clean line of view, facilitate streamlined views for multi-monitor setups and also meet aesthetic requirements.

Curved monitors are gaining traction, with them accounting for more than one-third of all monitors in 2018



Curved monitors create a near-complete field view, which provides an almost uniform visual focus that reduces eye movement across the screen. This enables people to maximize screen real estate and work more comfortably with fewer distractions and hence more productivity.



The demographics at work is changing and organizations need to adapt their display strategy accordingly to attract and retain best talent, which is increasingly going to be millennials



Their influx is impacting workspace policies, configurations and even technology choices. This cohort lives a completely digital, social and mobile lifestyle and demands freedom, better collaboration and sharing tools, and new technologies at work.

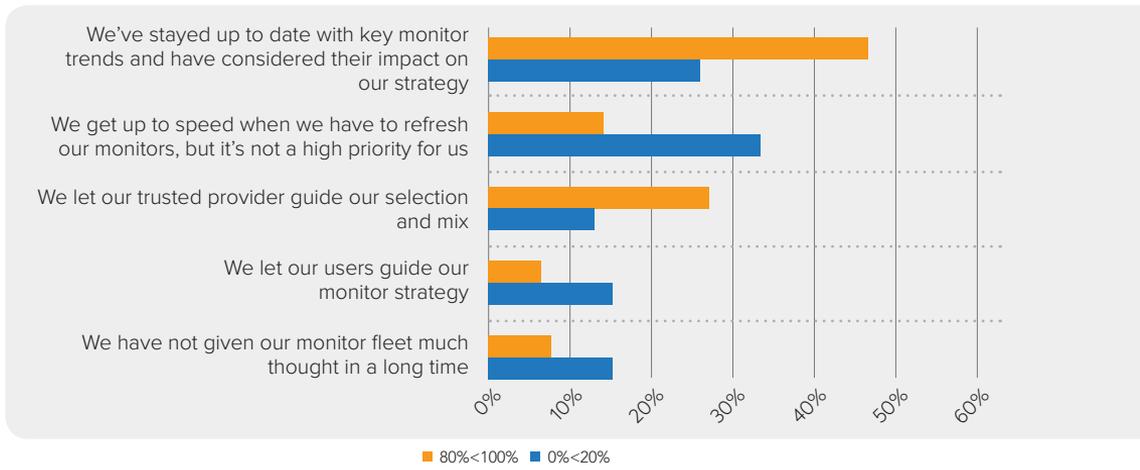
How would you characterize your company's display strategy (US Market)?



47% of companies comprising 4/5 or more of millennials keep current with monitor trends.



In contrast, only **27%** of companies with an employee profile of 1/5 or less of millennials keep pace with monitor trends.



MILLENNIAL SHARE OF WORKFORCE

The workforce is demanding better visualization tools due to rapid adoption of data analytics and AI

AI AND ANALYTICS EVERYWHERE



By 2020, 90% of large enterprises will generate revenue from data as a service — from the sale of raw data, derived metrics, insights and recommendations — up from nearly 50% in 2017

How well organizations derive meaningful insights from disparate sources and act upon them will be a key factor driving the innovation and creation of new products, services and experiences.

Today's workforce requires tools to visualize and interact with millions of data points from disparate sources. This could include complex models for supply chain optimization, unstructured social feeds, or data flowing in from thousands of IoT sensors. Effective visualization requires **more screen real estate, better resolution and the increased ability to interact and multitask.**

Case Study: Halliburton's Landmark



Landmark, a provider of software solutions to the oil and gas sector, utilized immersive VR and AR technologies, and interactive high definition (HD) displays to visualize complex 3D models of subsurface data critical for oil-well planning. One client reduced well-planning time from 80 to eight hours.

Utilizing these sophisticated tools, Landmark's clients are now better able to:



understand the risks and challenges in a particular scenario



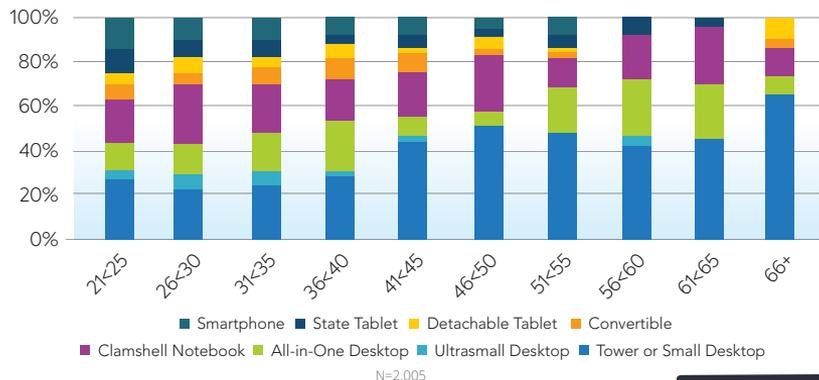
make more informed decisions through the creation of VR models of data with better interactivity with data



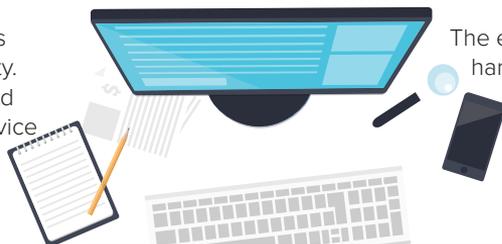
optimize plans and make faster decisions

Standardized device strategies: A thing of the past

Which **device** do you prefer using for office productivity (US Market)?



Millennial workers have dispersed device preferences than older workers when it comes to office productivity. Organizations need to provide them the right tools and displays so that they feel empowered at work and device as a service (DaaS) can help with this.



The emergence of DaaS allows companies to move away from hardline standardization and offer more choice to employees. It also facilitates the procurement of latest devices by lowering upfront costs and in some cases also the ability to flex-up or down.

The future worker will increasingly demand better devices, and DaaS can help organizations offload device management complexity and accelerate their refresh cycles. This includes displays as it helps organizations convert capex to opex and accelerate their monitor modernization plans in the wake of new demands such as interactive meeting-room displays, AR/VR and AI applications.

IDC predicts rapid adoption of **DaaS**



However, standardization through **USB-C** can reduce cable clutter and create seamless experiences

IDC predicts rapid adoption of **USB-C**

In 2022, USB-C will be found in:

8 out of 10 commercial notebooks;
2 of these will only have USB-C ports



7 out of 10 commercial desktops



USB-C monitors work seamlessly with any compatible notebook with a single cable – to deliver data/video and drive power up to 100W. Deploying monitors with USB-C is the surest way to deliver these benefits or futureproof for the Future of Work.



USB-C can be omni-protocol: 19.3% of commercial notebooks shipped in 2022 will feature only USB-C ports.



USB-C is also becoming an increasingly popular specification in tablets and smartphones



Single cable between PC and display for power/data/video for a cleaner desk



Delivers up from **65W to 100W** of power that can charge most PCs including the MacBook Pro



Charge your laptop via the monitor and get rid of messy power cables and adapters



Reduces cost of owning and managing multiple video cables, power adapters



Futureproof IT investments as the PC market shifts to more USB-C-enabled notebooks



Boost productivity by reducing time spent on connecting laptop to multiple cables

USB-C monitors allow for future-proofing

Essential guidance

A forward-looking display and monitor strategy keeps in mind the future needs of employees and customers. It should deliver better experiences, higher productivity and collaboration while improving decision-making through data visualization. Below are IDC's recommendations for business leaders and IT decision-makers, as they adapt their display and monitor strategy to Future of Work needs.

Changing workforce



The one-size-fits-all strategy of yesteryear just will not work as more digital natives join the workforce and demand for better displays

Evolving workstyles



Emerging ways of working require appropriate tools to empower workers of the future; displays should not be overlooked as part of the Future of Work strategy

Emerging technologies



Increased adoption of AI and more powerful business intelligence tools means there is exponentially more information available to your users; better displays and tools enable efficiency and productivity

Future-forward displays



Advanced resolutions and ultrawide monitors allow users to view more information comfortably, while modern designs meet future workspace goals around collaboration and aesthetics while adapting to shrinking workspaces

Choose simplicity



USB-C saves IT from the nuisance of dongles and accessories by offering a standard way to share content across multiple displays, while getting rid of multiple power cables. This emerging standard in new monitors supports the workforce's need for multiple devices

Empower employees and drive productivity, collaboration and innovation with Dell monitors

THE WORLD#1 MONITOR BRAND



Monitor technology and designs have improved significantly over the past few years to deliver on new demands for better resolution, viewing experience, greater interactivity and aesthetic needs. Dell has been at the forefront of this innovation to bring the best of display technologies to enterprises.

If your organization has not updated its display and monitor strategy in the last three to five years, it may be time to obtain new capabilities that deliver superior employee experiences, which allows you to attract and retain the best talent.

Dell monitors offer high-quality, immersive and intuitive seamless experiences to employees at the desk and in meeting rooms, and to your customers, wherever they interact with your content.

ENHANCED SCREEN EXPERIENCE



- Larger screens to facilitate multitasking
- Unprecedented detail of Ultra HD resolution - see more content
- Curved wide screen monitors for immersive, optimal viewing
- Rich colors, high contrast, brilliant clarity of high dynamic range (HDR) content
- Thin bezel design conducive to multi-monitor viewing
- Color consistency across a wide viewing angle

UNSURPASSED RELIABILITY



- Advanced Exchange Service to minimize downtime
- Premium Panel Guarantee
- Latest environmental/energy efficiency standards compliance

BETTER USABILITY



- Wider array of ports including USB-C for easy connectivity and a clean desk look
- Adjustable height, tilt, swivel and pivot options for optimal viewing
- Multi-client connectivity
- Conference room options - select monitors with interactive technology to promote collaboration
- Video conferencing options for long-distance collaboration right from a desktop
- Touch technology for business to engage with content easily and effortlessly

*Dell monitors are #1 worldwide for 5 consecutive years (2013 to 2017). Source: IDC Quarterly PC Monitor Tracker, Q1 2018

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