Global Megatrends shaping our future

There's so much change happening around us these days that it's easy to forget the speed at which things are changing.

We now have more computing power in our pocket than all of NASA had in 1969[1] to put the first man on the moon. India sent a spacecraft to Mars for less money than it took Hollywood to make the movie Gravity[2]. It took Uber a mere four years to hit $10 billion in gross revenue[3]. And Artificial Intelligence took just 42 hours to solve the 100-year-old mystery[4] of how flatworms regenerate body parts.

This pace of change will continue to accelerate at warp speed, with more change expected in the next 15 years than in all of human history to date.

Fuelled by faster technology advancements, our rapidly changing world finds us more connected and reliant on digital technologies, altering how we live, work, and socialize with one another. Uber and Airbnb are clear examples of new business models enabled by the always-connected, on-demand economy. Their success signals the beginning of the social and consumer phase of digitalization. As more businesses emerge to serve customers through digital offerings, new technologies will rapidly transfer from the enterprise to the individual.

So how do companies stay ahead of all this change, to innovate, adapt, reinvent and engineer experiences for a future that promises to look very different from today?

While we can't know what the future will hold, we can look to the major socio-economic, demographic and technological trends occurring across the globe to help guide us: Megatrends that we believe will have a sustained, transformative impact on the world in the years ahead—on businesses, societies, economies, cultures and our personal lives.

At HP, we've identified four major megatrends: Rapid Urbanization, Changing Demographics, Hyper Globalization, and Accelerated Innovation.

While Megatrends won't give us all the answers, they can be a beacon for where the world is headed, giving us the opportunity to adapt, chart, and reinvent our own future.

The opportunity is ours.

Our sprawling urban landscape

By 2030 there will be 8.5 billion people[5] walking the earth. 97% of that population growth will be in emerging economies, and most of these people will choose to call cities their home. By 2025, 5 billion people will live in cities, 2.5 billion of them in Asia.

As people move to cities, our cities will get larger, and we'll have more of them, including megacities in places many of us have never heard of today. In 1990, there were only 10 cities with more than 10 million people, but by 2030 we will have 41 such megacities. Meanwhile, the area of urbanized land could triple globally from 2000 to 2030. This is equivalent to adding an area bigger than Manhattan every single day.

With bigger cities comes major economic growth. By 2025, urbanization will welcome an additional 1.8 billion consumers[6] to the world economy, 95% of them in emerging markets. And consumers in emerging markets are forecast to spend $30 trillion in 2025, up from $12 trillion in 2010.

As economic conditions improve and social attitudes change, more women will have a major impact on the world economy. From growing participation in the global labour force, to economic wealth and spending drivers. In the US, it is estimated that women controlled an estimated $14 trillion of wealth in 2015, and women influence 85% of all consumer purchases.

In the next decade, it is estimated that close to 1 billion women, mostly in the developing world, are going to enter the formal economy and become new economic contributors, as full-time workers and micro-entrepreneurs.

The growing pace of urban migration, access to education, better health, mobile technologies, and micro credit will continue to fuel this phenomenon.

But while emerging economies experience a growing middle class, a rift is expanding between haves and have-nots in developed nations, with many consumers driven more by value than quality.

If the 20th-century economy can be defined by the burgeoning middle class in the industrialized economies of the US and Europe, then the 21st-century economy will be defined by the expanding middle class in developing and emerging countries especially in Asia and specifically driven by India and China. These two middle classes will represent two very different consumer groups; one saddled with debt and declining

income driven to buy value purchases, and the other an affluent buyer looking for luxury and high-end products.

An influx of urban consumers will drive new business models, changing the way we buy and consume products, and increasing the need for more personalized and localized services. 3D printing capabilities, like the ones HP is spearheading, will enable cities
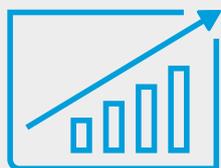
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to respond to the growing and changing needs of their residents by printing on demand whatever is needed— for construction, entertainment, shopping, education, even new types of food items—rather than relying on a physical supply chain. Using 3D printing, complex assemblies can be redesigned into a single part to simplify production.

As millions of people move to cities every week, they will also place a huge strain on space, city resources, energy requirements, and infrastructure costs, forcing homes, offices, and cities to become smarter and more efficient. To address this, we are seeing a surge in the number of smart city and micro-living initiatives. In the past two years, the number of smart city initiatives has almost doubled. As more people move

to cities, demand for housing and co-working spaces is also on the rise with micro-housing and co-working spaces becoming growing trends across the globe.

Large corporations, like HP, along with governments and city officials need to address the opportunities and challenges posed by this rapid urbanization. Looking for ways to enable cities, homes and offices to be more sustainable and efficient. Creating new services customized to urban users in cities all over the world. Developing products and services with new classes of consumers in mind.

Rapid Urbanization presents an amazing opportunity to think smarter about products, services, and our surroundings.

Changing Demographics: Shifting the tapestry of society

This brave new world we live in of constant change is giving way to a reimagining of our socio-economic landscape.

On the one hand, we have a new generation that is beginning to enter the workforce, known as Generation Z (Gen Z). This is the generation born between 1995 and 2010, and numbers 2.6 billion globally. Gen Z comprises about a quarter of the US population and will account for 40% of all consumers[7] by 2020. According to the Department of Labor, by 2020 Gen Z will make up 36% of the global workforce.

This is the first generation that has never known a world without the internet and who were practically born with a smart phone in their hands. Having never spent a day of their lives offline, they are acutely aware of the issues and global challenges happening in the world around them. It should come as no surprise they are 54% more

likely to say they want to have an impact on the world as compared to millennials.

Gen Z's attitudes toward work and employers are very different to previous generations, as almost half of them consider working for a company that helps make the world a better place as important a consideration as salary. Their nomadic lifestyles have them craving more flexibility in where, how, and when they work. As active participants in the "Gig Economy"—an environment where short-term, freelance positions are preferred over full-time jobs—Gen Z is a driving force behind new collaborative learning, technology, and workforce trends.

Yet at the same time, more countries are becoming super-aged, which means more than 20 percent of their population is over the age of 65. By 2030, we'll have twice as many people over age 65—nearly one billion[8].

In fact, thanks to people living longer and having few babies, per the World Bank Databank, by 2060 we'll have 3 billion more people over the age of 30 than we do today. China is a perfect example of this phenomenon. Today 26% of their population is over the age of 55. And according to UN Population data, that number will grow to 43% by 2030. To deal with this shift, China recently rescinded their one child policy after 35 years.

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An older population leads to a shrinking and aging workforce, putting increased pressure on healthcare and retirement. The aging workforce will also put a strain on economies and government spending, simply because as the world ages, there will be fewer people working to support the number of people retiring.

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$15 trillion

On the bright side, an aging working population also means a significant market opportunity. Often referred to as the "silver generation", this population has greater purchasing power than their younger counterparts and represents a significant untapped opportunity for companies in the future. The European Commission estimates that by 2020, the spending power of people over 50 will reach $15 trillion. This will create a significant

shift for brands who today devote most of their marketing spends to people under the age of 30, even though in places like North America half of the money spent is by people over the age of 50.

Along with aging comes the possibility of chronic diseases such as diabetes, chronic obstructive pulmonary disease, and Alzheimer's all of which are on the rise. These long-term degenerative diseases place a high-cost burden on our healthcare systems. The sooner doctors can detect, treat, and/or prevent these conditions in patients, the more they can reduce this burden.

Unfortunately, at the same time, we are facing a shortage of 90,000 fewer physicians in the U.S. alone by 2025, including those who specialize in chronic diseases. We will need to harness the exponential technology growth of faster computing, artificial intelligence, big data, mobility, microfluidics, and the Internet of Things (IoT) to help us meet these growing health challenges in spite of this shortage.

Today's new and evolving platforms comprise well-defined architecture, governance, and services, and are underpinned by the latest digital tools. In healthcare, platforms for care delivery will evolve, improving the ability to provide relevant

information, access, and control to consumers and caregivers. Care will be ubiquitous, drug development times will be reduced, and new treatments will arise. With increased technological power, the next wave of digital health solutions could move us from prevention to elimination.

HP is working on advancements in microfluidics, IoT, and Hypermobility to move from the world where systems are centralized—where testing is very expensive and slow—into a world of global diagnostics, where things happen very cheaply and the power is put into the hands of the individual.

Catering to this diverse customer base that spans generations will require companies to rethink how they design products, structure their global labor force, and what benefits and services they provide.

We're not yet sure what that will look like. Is it commercial wearables for increased productivity at work? New collaboration tools for nomadic workers? Disruptive healthcare solutions? Personal robotic solutions to augment our lives and automate tasks?

Or all of the above?

Hyper Globalization: powering a global marketplace

Globalization arguably began 2,000 years ago with the 6,000km Silk Road that connected Eurasia. However, no one can argue that a truly dramatic 'flattening' of the world happened when the internet was created. And today it's not just data that's freely flowing between countries—it's capital, products, services, and people. For example, how and where we design, sell, and manufacture products will become both hyper-global and hyper-local thanks to us now living in a globally connected world with a diverse set of local requirements.

Amplifying this globalization is the internet, which has enabled the growth of a vast digital marketplace from companies we've never heard of, from cities we've never been to, and working on digital platforms that are changing the competitive landscape. Anyone with an idea can become a global business overnight.

It's easier now than ever before for start-ups to scale globally and for emerging market companies to challenge established multinationals. According to McKinsey Global Institute, by 2025, nearly half the Fortune 500 will be headquartered in today's emerging markets.

Market disruption has become the new norm. Gone are the days when 75-year-old companies were commonplace. The average tenure of companies on the S&P 500 dropped from 35 years in 1980 to 18 years in 2012. By 2027, 75 percent of current S&P 500 companies will be removed from the index.

Disruption is now happening everywhere to everyone, even to those companies who were themselves doing the disrupting just a few short years ago. Companies around the globe must constantly reinvent themselves to stay competitive.

Those companies that succeed will also have to be ready to handle new forms of payment, as for how consumers buy and pay for products and services, is also being digitized. Gradually money has gone through a digital transformation with credit cards and debit cards being the physical manifestation of the transition. Recently a new transition is taking place; to eliminate the analogue aspect of a card and completely digitize the entire card system.

Enabling this transition will not be an easy task, considering that even today 85% of global consumer transactions annually

are done with paper bills and coins—especially in developing countries. But changes are already underway making it easier for people across the globe to transfer data instead of cash. That agent of this change—is the smartphone.

Online and mobile payments will lead to mostly cashless societies in Norway, Denmark, and Sweden within 5 years. A trend that is supported by Millennials around the world, 52% of whom use a smartphone as a mobile payment device.

The emergence of new technologies such as digital wallets, near-field communications (NFC), crypto-currencies—including Bitcoin—mobile peer-to-peer payments, and the use of biometrics for authentication will tip the balance farther and farther in favour of digital currency.

However, with the speed of global technology adoption also comes an increase in the supply and demand for cyber-attacks. Information is power and cyber-attacks are hard to attribute as witnessed by the 2016 Democratic National Convention email hack during the U.S. election. There will be an increased emphasis on technology companies to innovate and achieve much higher degrees of trust and resilience. HP's Security Lab has several initiatives underway to tackle the growing landscape of cybersecurity threats and how HP is designing for cyber-resilience in a Blended Reality future.

Companies will need to help customers navigate constant disruption, smartly and securely in an increasingly globalized world. While at the same time, embarking on supplier and government partnerships that enable them

to move manufacturing closer their customers. Enabling them to provide on-demand products customized based on geography and personal preference.

A widely-connected world will reward companies willing to embrace change and disruption.

The possibilities are endless.

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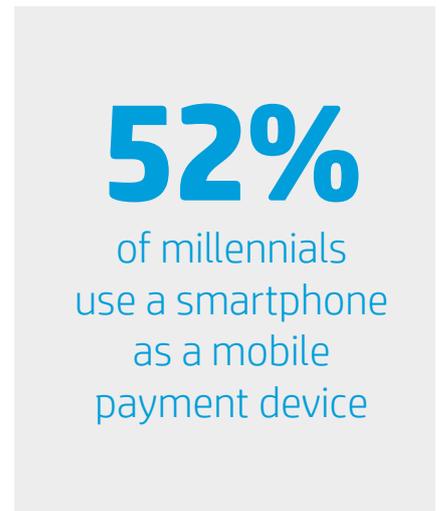
Accelerated Innovation: The building blocks to tomorrow

Even though we are being constantly bombarded with faster, cheaper, and more powerful technology, it's easy to forget that the rapid pace of technological change is because digital technologies generally follow an exponential trajectory versus a linear one. That's why in 30 years' time, our phones won't just be 30 times more powerful but a billion times more powerful than they are today. The rapid pace of change we are experiencing today will accelerate as we move forward.

As technology components mature and become commoditized, they become the building blocks for new breakthroughs to emerge. Emerging technology trends like Hypermobility, 3D Transformation, Internet of ALL Things, and Smart Machines will harness advancements in computing power, connectivity and immersive computing to deliver richer experiences.

Hypermobility will see us move from devices we carry and wear, to computing that's a part of us. Interfacing with technology will be as natural as a glance, a hand wave or a thought. Technology will seamlessly work in the background monitoring and enhancing our lives.

3D Transformation will fundamentally change how products are designed and manufactured; democratizing the design process, creating more flexibility and speeding up the entire end-to-end production process.

Internet of ALL Things will make way for a world where technology will become part of everyday objects and devices, connected and communicating via the internet.

Smart Machines will lead to the dawn of a new age, where objects and devices become infused with machine learning and artificial

intelligence (AI), allowing them to not only assist us, but even anticipate our needs.

We will see a shift from power to intelligence-enhancing capabilities offering virtually limitless opportunities for expansion. Increasingly, material science, machine interfaces, analytics, immersive computing, efficiency and accessibility, rather than just the cost or power of components, will define the innovative products of tomorrow.

This will lead to massive automation of tasks, manufacturing, and our workforce. The trajectory of manual job automation continues with the adoption of industrial and service robots across industries. McKinsey predicts that 40 million to 75 million jobs could be jeopardized by robots in the next ten years. In China for instance, factories have already begun to replace workers with robots. Apple supplier Foxconn replaced 60,000

factory workers with robots in a single factory in Kunshan, China. As many as 600 other companies in Kunshan have said they have similar plans.

There is even talk of giving this growing robotic workforce "rights"—much like human labor rights and labor unions. In fact, a draft European Parliament motion dated May 2016 urged the European Commission to rethink taxation and legal liability policy due to the increasing number of robots being deployed in factories and services industries.

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And it's not just manual tasks that are being automated. Artificial intelligence and robotics are being put to work performing high-level cognitive jobs from healthcare diagnosis to publishing and advertising, and even making investment decisions in the boardroom. As an example, take a look at McCann Erickson Japan's new AI Creative Director.

This 'smart movement' will impact every aspect of our lives, with intelligent agents and bots always at the ready, orchestrating our digital lives. From prioritizing your email to scheduling your calendar, and from sending flowers to your mother on her birthday to planning and booking your vacations—bots may become as critical to our existence as the internet itself is today.

With the exponential rate of change and technologic advancements, our virtual AI

assistants will become smarter and smarter, not only looking after our every need but anticipating them.

All of these technology advancements will blur the lines between our physical and digital worlds to make us more productive and more creative, freeing us to spend time with the people we love. At HP, we call this Blended Reality: the fusing together of our physical and digital worlds, to create new and improved experiences for people.

As technology leaders and innovators, it will be up to us to look out for new emerging technologies on the horizon, that will themselves one day become the future building blocks for huge new products and services that enrich our customers' lives.

The possibilities are endless for a man + machine-enabled world.

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3 https://www.reuters.com/article/us-uber-tech-fundraising-idUSKCN0QQ0G320150821

4 https://www.livescience.com/51107-artificial-intelligence-solves-regeneration-puzzle.html

5 http://www.un.org/en/development/desa/news/population/2015-report.html

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