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AI-ASSISTED KNOWLEDGE WORK

AI and automation are fundamentally changing the way we work, but we are only beginning to scratch the surface.

MONEY OF THE FUTURE

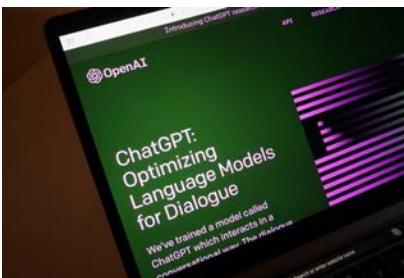
Money is entering a period of unprecedented change. In an interconnected world, money must adapt to remain relevant.

THE FUTURE OF LOGISTICS IS SMART

With 6.8 billion people living in urban areas by 2050, applying intelligence to how we move goods and people is critical.

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The future is alive with possibilities. At Futureworld, we do not predict the future – no one can! But we can highlight strong and weak signals that point to a future where almost anything is possible if we are bold enough to imagine it. Fundamental to our analysis is the exponentially accelerating pace of technology, spawning disruptive forces in every industry, and creating future risks – and opportunities –

for business. In this rapidly changing world, technologies converge and supercharge their impact, threatening established incumbent businesses, but also opening ‘white spaces’ for new, nimble

players, and even creating entirely new industries.

Here is a range of possibilities for the future, and the new opportunities they may hold.

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AI-ASSISTED KNOWLEDGE WORK

Artificial Intelligence (AI) has come a long way in recent years, and its capabilities continue to expand at a rapid pace. While it is widely accepted that AI and automation have already fundamentally altered repetitive, process-based activities, recent advances have raised serious questions about the potential impact on the role of knowledge workers. As we look to the future, it's clear AI has the potential to radically change the way we work.

Imagine a world in which your AI-powered personal assistant not only schedules your meetings and reminds you of deadlines, but also proactively suggests new ideas, finds relevant information, and

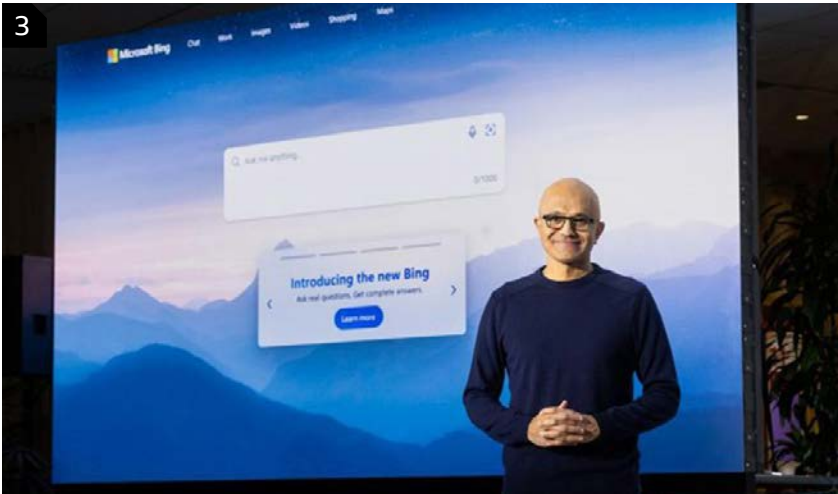
even conducts research on your behalf. This is made possible by the convergence of natural language processing, machine learning, and computer vision, which allows the AI to understand and process vast amounts of data quickly and accurately.

But it's not just your personal assistant that is being impacted by AI. In this future scenario, AI is also being used to enhance other aspects of work, such as decision-making, problem-solving, and collaboration.

Think of a team of engineers using AI-powered tools in conjunction with other technologies, like the Internet of Things (IoT), big

data, and blockchain, to create a new type of working environment in the mining industry. For example, a company like Caterpillar uses AI to optimize the performance of their mining trucks. The AI analyzes data from sensors on the truck and adjusts the engine and transmission settings to improve fuel efficiency, reduce emissions, and extend the life of the equipment, augmenting the role of a traditional engineer.

In any customer-facing industry, AI-powered chatbots are already impacting customer service – and we've barely scratched the surface of the potential of this technology. By automating routine tasks, such as answering product information or order status queries,



1. AI-powered chat bots have already resulted in significant improvements in customer service efficiency and customer satisfaction. 2. OpenAI's ChatGPT3 took 5 days to amass 1 million users worldwide, and by January 2023 had already hit 100 million users. 3. Microsoft joined forces with OpenAI to integrate their ChatGPT4 technology into its Bing search engine. 4. Caterpillar uses AI to optimize the performance of its mining trucks, improving fuel efficiency, reducing emissions, and extending the life of its equipment.

chatbots free up customer service representatives to focus on more complex and urgent inquiries, leading to higher productivity and job satisfaction. Companies, such as H&M, Lowe's, Discovery South Africa, and Sephora, have already started using these technologies and have seen significant operational improvements. For example, H&M reported that the chatbot helped to reduce the number of customer service inquiries by 30% and improved customer satisfaction by 25%, while Lowe's reported a reduction of 20% in customer service inquiries and a 15% improvement in customer satisfaction. These chatbots use natural language processing and machine learning to understand

customer inquiries and provide accurate and efficient responses, improving customer satisfaction and building customer loyalty.

As we look to the future, AI has the potential to change the way knowledge workers operate across industries. In the next 10 years, knowledge workers will have access to a wide range of AI-powered tools to enable greater productivity, efficiency, and efficacy. These tools will allow them to analyze data, predict future events, and automate routine tasks, which will free up their time to focus on more complex and strategic activities. Furthermore, AI will be integrated into the workplace, and knowledge workers will be able

to collaborate with AI systems in real-time, leading to the creation of new and innovative solutions. As a result, knowledge workers will be able to make better decisions and improve their overall performance, creating a more efficient and effective working environment. 🌐

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SMART LOGISTICS OF THE FUTURE

Back in 1950, 30% of the world's population lived in urban areas. Thanks to economic development, government policies, and population growth, by the year 2000, that figure stood at 47% and today, 56% of people globally live in urban areas. According to the World Bank, this figure is expected to further increase, to 68%, by 2050.

More densely populated urban areas require new approaches to transport and logistics, as city planners grapple to find ways to move people and goods. For some, this is an opportunity to redesign the infrastructure with a growing

population in mind. Smart logistics, which could include autonomous vehicles, ride sharing systems, last mile delivery drones, and robots - all supported by relevant data - will ensure the efficient delivery of goods, services, and even people.

The implementation of an intelligent transport system requires all modes of transport to be connected in such a way that a user hardly feels the transition from one to the next. Imagine hiring a shareable bike 50m from your door, riding it to a green bus station 10 min away, taking that green bus (that doesn't have to

stop for traffic signals) all the way to your destination, then reversing that process on your return journey. Now, imagine doing all that using one integrated prepaid system.

To enable this, the city would require a network of sensors and cameras, as well as a range of connected Internet of Things (IoT) devices all collecting and analyzing data to improve the overall experience.

While self-driving cars may only be ubiquitous in the medium-to-long-term, an easier starting point could be technologies similar

to those widely available today. Adaptive traffic lights, for instance, could be a low hanging fruit for cities beginning a smart logistics journey. South Korean company, BlueSignal, has launched an AI-based solution to track traffic, congestion, and traffic light signal data. The data is then used to forecast traffic conditions and determine the quickest and safest routes with surprising accuracy. The system has already been tested in South Korea, and BlueSignal has won contracts with the Shenzhen Municipal government in China and will be partnering with China Hualu Group (Chinese state-owned electronics manufacturer) to create a smart traffic system for the Group.

US-based Rapid Flow is also targeting congestion by placing cameras at intersections to optimize traffic light performance based on the actual on-road traffic. This technology has been rolled out in various cities, including Portland in Maine, Kane County in Illinois, and Quincy in Massachusetts.

The above examples demonstrate how smart systems can be used to improve the efficiency and sustainability of a city's transport and logistics systems. Smart logistics can manage the movement of goods and people in real time, ensuring smooth operations and a more efficient and sustainable city. 🌐

**BY 2050, IT'S
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1. inside Amazon's flagship fulfillment center outside Seattle, where the retailer uses algorithms and robots to ship more than a million packages a day – vastly changing the jobs of humans in the process. **2.** Pyka's autonomous electric Pelican Cargo airplane offers 200 miles range and 400 lb payload in 66 cubic feet volume.



REINVENTING **MONEY**

Money is entering a period of unprecedented change, driven by the rise of digital currencies and decentralized finance, as well as its intersection with technologies such as Artificial Intelligence (AI), Internet of Things (IoT), and Distributed Ledger Technology (DLT). In an interconnected and digital world, money must adapt to become smart and agile enough to move across the physical and virtual worlds seamlessly. This evolution is already taking place as digital finance becomes more efficient, secure, and accessible.

THE EMBEDDED FINANCE INDUSTRY IS REDEFINING WHO CAN PROVIDE FINANCIAL SERVICES AND IS PROJECTED TO GROW FROM \$42 BILLION TODAY TO \$250 BILLION IN 2032

However, the impact of change is rarely linear. Today, the world is shifting to digital, contactless payments, and ease-of-use is driving the evolution of money. But in the future, we will look back and realize that the compounding effect of these seemingly independent signals ushered in a tsunami of change.

Traditional financial institutions are already experiencing the impact of change. Their margins are being squeezed as they are becoming less relevant to consumers, who are turning to newer, nimbler players that offer a wider range of services at a lower cost. Embedded finance, the integration of financial services into non-financial products or services, is expanding the landscape and definition of companies that can provide financial services. The industry is projected to grow from \$42 billion in 2022 to \$250 billion in 2032 as more consumer businesses incorporate synergistic financial products into their offerings.

It is not just the financial institutions that are in the path of this disruptive wave. As payments become borderless, quicker, smarter, frictionless and way

easier, businesses not only need to adapt their tech infrastructure to support the landscape of digital interactions and transactions, but they also need to interrogate their business models to ensure they can capitalize on opportunities unlocked by this evolution.

Southeast Asian countries (ASEAN) are an early use case of the rapid boom of digital consumer finance. ASEAN, currently the world's fastest-growing region for mobile wallets, forecasts the number of active accounts will triple to around 440 million by 2025 and will capture almost 75% of all ecommerce value in the region.

Wallets are becoming more than just a store of value. They are a medium for every type of payment, and are becoming the access points for gaming, commerce, loyalty, and even 'super apps' or financial superstores. Many financial institutions and consumer businesses are turning to fintechs to help keep them relevant in this rapidly changing landscape. As of September 2022, at least 274 fintech companies have emerged as unicorns (valued at more than \$1 billion) and collectively have a market value of over \$1 trillion.

This begs the question, is your business ready for this shift? The definition of who your competitors are might be changing as innovators explore adjacent and complimentary business models. Starbucks is one such example. In 2022, they amassed and managed over \$1 billion in unspent, preloaded balances in customer accounts. To put that into context, only 15% of US banks had over \$1 billion dollars in assets during the same year. This, combined with their already advanced payment processing, consumer analytics capabilities, and massive footprint, could put them in contention to become a global, borderless, consumer bank.

The future of money is evolving rapidly as the convergence of digital currencies, decentralized finance, and emerging technologies continues to reimagine the way we interact with businesses and each other. Those who are slow to adapt will be washed away by the wave of change, while those agile enough to embrace disruptive change and innovate will be the driving force behind it. 

AN ENERGY BLACK SWAN?

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Since the industrial revolution, humanity has struggled to keep up with its own energy consumption needs. As carbon emissions continue to escalate, the planet's resources become increasingly constrained. Add global population growth and rapid urbanization to the mix and you have the makings of the perfect energy storm. The only way to enable continued growth and development is to establish stable, reliable, accessible alternative energy sources.

While newcomers are changing the global energy landscape, humanity's appetite for energy remains insatiable. A sustained shift towards renewable, 'green' energy sources has resulted in an enormous capital and effort investment in resource exploration and energy generation and transmission.

Throughout history, the development of energy sources has been littered with unpredictable

turns, many resulting in significant financial and human losses. In 2007, Nassim Nicholas Taleb used the metaphor of a 'black swan' to describe high impact events thought to be so unlikely they were considered impossible, until they happened. Many of our energy exploration watershed moments have, indeed, been black swan events, changing the trajectory of numerous countries and economies over the years.

The invention of the modern solar-electric cell could be seen as one such black swan event, discovered in the 1950s largely by accident when researchers were exploring the properties of silicon semiconductors. As the technology is refined, solar power becomes cheaper and more effective. Solar power is now ~85% cheaper than it was a decade ago, and this cost-efficiency has resulted in a number of global space agencies launching studies into the feasibility of space-based solar power plants. Although

cost-efficiency is an alluring prospect, it is certainly not the only driver.

In contrast to terrestrial arrays, space-based solar arrays are exposed to constant sunshine with no interference from clouds or impurities in the air. The \$455 million market is expected to almost double in size over the next 5 years as more companies and governments invest. Early movers in the space include American-based, Airborne, and Germany's Zur Space Solar Power, which have already made significant investments; and the UK and Saudi Arabian governments recently announced a joint investment to develop a space-based solar plant.

Another alternative many people hope will fuel our energy needs into the future is hydrogen power, particularly for sectors considered difficult to decarbonize, such as mining. Hydrogen is seen as an 'all-rounder' because it can be



used as an energy carrier as well as a resource in energy and heat generation, transport, and buildings. Thanks to its versatility, more than 30 countries have already released hydrogen roadmaps and in excess of 200 hydrogen projects have been announced. EPRO Advanced Technology has successfully locked hydrogen into a powder form, released through the addition of water. This advancement significantly simplifies the transportation of hydrogen and could change the entire value chain as we know it, accelerating hydrogen production, transmission, distribution, retail, and end-applications.

Hydrogen produced using renewable energy could enable emissions-intensive industries to reduce their overall emissions in a variety of ways. One application is to generate electricity from fuel cells by converting green hydrogen back into electricity. In this way, green hydrogen can not only be used as a fuel, but also to generate heat in buildings or power vehicles.

Despite the obvious benefits, the penetration of hydrogen-powered vehicles is relatively low because they are expensive and require specialized hydrogen filling station networks. However, these obstacles are gradually being overcome, with Germany having set the target to have 200 hydrogen filling stations by the end of 2023.

Hydrogen is also seen as a viable power source for other vehicle types, from industrial trucks and rail transport to planes and cargo and cruise ships. China and Germany are already testing hydrogen-powered trains, with many other countries set to follow suit, and Airbus has made great strides with its ZEROe concept hybrid-hydrogen aircraft, while hydrogen-powered cargo ships are increasingly being seen on the world's oceans.

Despite the technological advances, green hydrogen technology remains cost-intensive with high manufacturing costs being a key barrier to the technology becoming more mainstream. At the

same time, hydrogen aspirations compete with other green technology applications, especially those that are already mature, such as electromobility, lithium-ion energy storage systems, or digital energy efficiency systems. Without extensive financing and organizations willing to take the risk, the development of the hydrogen economy will remain stunted.

These evolving technologies will create massive disruption in traditional, oil-, gas-, chemical-, and mineral-processing industries, and global energy companies stand to lose billions of dollars if they fail to transition away from fossil fuels. One might argue that this is the reason we will never fully transition away from fossil fuels, that we will be held to ransom by those companies and countries who stand to lose the most. Which begs the question, is the world heading towards an energy war? Could another black swan event be brewing? 🌀

DATA-DRIVEN WORLD AND COMMERCE

By 2030, the world will be entering the 6G era – an intelligently autonomous, integrated, sensory, massively distributed but highly networked world that blends our physical, digital, and human systems. At present, there is no industry or endeavour that is immune to the impact of digital and data-based disruption. The data economy and the convergence of data, cloud technologies, Internet of Things (IoT), and connected devices are the driving forces behind the exponential acceleration of the fourth industrial and digital revolution. The past decade's data explosion has created a seemingly infinite universe of data, ever expanding to the outer edge of what we can store in the cloud. Making sense and use of data will drive strategic choices, shape market advantage, and enable disruption.

Possibly the most dramatic outcome of the digital revolution is the sheer volume of data created, collected, distributed, and analyzed – a volume inconceivable just a few decades ago. The extent and pace of technological change unleashed by data and the data economy will have far-reaching implications across almost all industries. When you consider 90% of the world's data was created in the last 2 years and

1 trillion devices were connected by 2022, it's easy to understand how the total amount of global data is forecast to increase tenfold by 2025. One of the second order implications of the acceleration of data creation is the impact it has on accelerating Artificial Intelligence (AI) technologies powered by Big Data, which in turn drives further technology and industry advances.

The clear exponential nature of the data economy is presenting itself as a tsunami of change and a global megatrend. Matched with this, computing power is growing exponentially, with the global cloud microservices platform market expected to generate \$4.2 billion in revenue by 2028. This in turn impacts not only how we create and store data, but how we are able to extract and synthesize that data.

The implications of the data economy are profound and far-reaching, as illustrated by the exponential nature of the growth we are seeing across all aspects of life. Every second sees exponentially more data generated, exponentially more 'things' connected. The vast network of connected devices generating and collecting immense volumes of data, requires processing, storage,

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and analysis to gain insights into customer behaviour, market trends, operational efficiencies, and so much more. This, paired with growing awareness of the commercial value of consumer data through machine learning and artificial intelligence, will enable companies to extract even more value from real-time data and insights. These technologies are helping companies automate processes, streamline operations, and create new revenue streams.

In big tech, we have seen companies position themselves at the forefront of the digital and data revolution, investing in data-driven and AI technologies. OpenAI has been at the forefront of AI research and development, with early-stage investors including Microsoft and Amazon. Subsequently, Microsoft

has already progressed the integration of OpenAI technology into its search engine, Bing, as well as its Office365 products. Amazon is similarly utilizing AI in its logistics and delivery operations, and in customer-facing services, like Amazon Alexa. Alibaba has been leveraging data and AI in e-commerce, logistics, and financial services through platforms like Taobao and Alipay.

Tech giants are not the only players in AI and Big Data. More specialized companies are developing cutting-edge processors and taking massive steps forward in quantum computing, which are essential to meet the computational demands of Big Data and AI. Big Data, together with AI, is reshaping the health sector and medicine. Successfully leveraging Big Data and AI in the US health care system could result in \$150 billion in annual savings by 2026. From robotic surgeries, aided by integrating diagnostic imaging

and pre-op medical data, to virtual nursing assistants to simplify initial diagnoses, triage, and patient logistics, the applications are endless. Similarly, spurred by soaring global investment in robots that could reach anywhere between \$25 billion and \$140 billion by 2027, Big Data and AI will revolutionize industrial automation in the physical world.

In the private sector, we have seen the tide of information rising faster than our ability to harness it. This growing universe of data holds the promise of and need for more insight and value, but we can't process it as quickly as it's generated. And that is the Data Paradox.

Businesses must be ready to incorporate data-driven decision-making and technologies across operations to capitalize on new opportunities. Data will drive new business models and ecosystems as it disrupts industries and creates

entirely new ones. The rise of data-driven platforms has already disrupted traditional business models, and this trend will continue to accelerate. Companies that can effectively harness the power of data will reap significant rewards, while those that fail to adapt will be left behind. We are ushering in a new era of commerce, where an organization's competitive advantage is directly determined by how fast it converts data into insights to drive business outcomes and create new value.

In the coming years, we can expect to see an emphasis on the 'data fabric' – a combination of data management architecture and technology that optimizes access to distributed data and intelligently curates and orchestrates it for delivery to users. Being digital is no longer a differentiation, but rather consumers will seek out those who are leading the race through innovation and data-based decision-making. 



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FOOD SYNTHESIS: THE FUTURE OF FOOD?

The agricultural and food industry has radically transformed over the last 50 years, and we can expect further disruption in the future. By 2050, we anticipate a 59% increase in food demand and a global water crisis occupying the number one spot on the global threat list. With the global population expected to top 10 billion by 2050, the food supply industry faces immense constraints, with the world's agricultural systems unable to meet global demand without innovation. Further compounding this is the understanding that if we don't radically pivot and

fundamentally shift towards sustainability, we won't have until 2050.

To meet the increasing global food demands, the agricultural industry will see significant disruption fuelled by the need to produce more with less resources and inputs. However, agriculture's relationship with the climate is far more complex than most other industries, as it is not only a contributor, but also a victim of the changes occurring. Rising temperatures, changes in rainfall patterns, and more frequent

wildfires are just some of the consequences of climate change threatening agricultural production globally.

Climate change and sustainability are at the forefront of industry and government considerations, and, although the food tech transition will be market-led, policy will determine its scale and speed. To date, 12% of greenhouse gas emissions are allocated to agriculture and roughly 30% of global energy is consumed by the agricultural and food sectors. It's estimated that 30% of the food produced is wasted at various stages of the supply chain and in the homes of consumers. If this trend could be reversed, it would save enough food to feed 2 billion people or reduce global emissions by 8-10%.

The significant demand for energy, water, and food has placed strain on finite resources, compounding the need for



innovation, sustainability, and energy efficiency in the food and agriculture sector. Food synthesis has the potential to address the challenges posed by a growing global population, climate change, and constrained resources.

With these mega trends shifting the food industry, the need to address suboptimal energy use and resource allocation is more pressing than ever before. Technology is a key pillar on which the industry will rely. Artificial Intelligence (AI), analytics, connected sensors, and other emerging technologies can further increase yields, improve resource efficiencies, and build sustainability and resilience across crop cultivation. This in turn could generate an additional 7-9% yield and \$500 billion in global GDP by 2030.

Another area where technology will be key for optimizing resources is precision agriculture. Unmanned Aerial Vehicles (UAVs), Geographic Information System (GIS) and Global Positioning System (GPS) satellite technology, biotech, quantum computing, and AI are all mechanisms to improve and drive planning of agricultural operations for an extended period, adjusting the real-time strategy during force majeure events. Precision variable rate technologies, making use of data and automation to apply materials (seeds, fertilizer, water, etc.) at different rates, based on precise locations, are already projected to boost agriculture yields by 10-15% globally by 2025.

The future of food will see an acceleration and expansion of indoor agriculture of all kinds – greenhouses, aquaponics, aeroponics, hydroponics, and vertical farming operations that require significantly less space, water, and soil to propagate crops. Rapid urbanization and the emergence of megacities has increased the demand for locally sourced food and is likely to drive the development of vertical and urban agriculture, making it possible to grow fresh produce in urban areas. Indoor vertical farms can save 90-99% of the land, water, and fertilizer used in traditional farming and require no pesticides or insecticides.

With the advancement of genomics, the food industry is likely to shift towards personalized nutrition. This will involve the production of food tailored to individual genetic profiles, dietary needs, and health conditions.

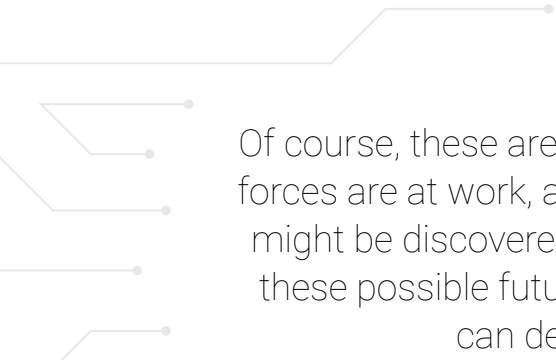
There has already been a global shift towards plant-based and alternative protein sources as consumers increasingly seek more sustainable and healthier food options. The shift will accelerate growth in the plant-based and alternative protein industries, with new technologies, such as precision fermentation, biomass and cultivated meat driving disruption. It is estimated that US federal investment in the alternative protein industry could generate over 200,000 jobs by 2030. The high environmental costs associated

with producing animal feed has resulted in insect farming to provide a sustainable source of protein for animal feed. These insect farms use food waste to feed insect larvae that are then converted to protein to supplement animal feed. There are social barriers that must be overcome before this practice is widely adopted, however insect farming has the potential to convert 1.3 billion tons of bio-waste into protein each year.

The confluence of global megatrends and converging technologies will shift the future of food exponentially, creating immense opportunity for innovation. The rest of industry can take learnings from these waves of change within the agriculture sector to think critically and creatively about how the future of sustainability and resource efficiency should direct and drive their business and strategy of the future. 

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1. lab-grown, or cultivated meats, precision fermentation, and biomass technologies are likely to generate increasing disruption in the food industry during the upcoming decade as the technology refines and advances. **2.** the coming decade will see acceleration of indoor agriculture, like greenhouses, aquaponics, hydroponics, and vertical farming – anything that requires less space, water, and soil to propagate crops.



Of course, these are only a few of the market spaces where disruptive forces are at work, and game-changing new investment opportunities might be discovered. At Futureworld, we work with clients to explore these possible futures, and identify suitable playing fields where we can design and create tomorrow, together.

Contact any of us directly, or email info@futureworld.org to start the journey.

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