

TRANSFORMATION AGE

SHAPING YOUR FUTURE

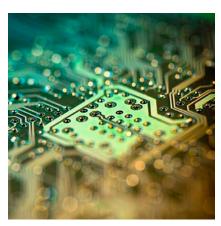
Transformation Age: Shaping Your Future, the third publication in the MHI Roadmap Series, is intended to provide material handling, logistics and supply chain industry professionals insights into trends impacting success in the next 10 to 20 years.



SHAPING YOUR FUTURE



FIRM OF THE FUTURE



TOOLS



MARKET INFLUENCERS



GLOBAL MARKETPLACE



NEW SPACE ECONOMY

Many factors will fuel the emergence, growth and impact of trends in the coming decade. Some will gain singular attention while others will attain only subtle note as part of a larger sweep of change.



Many factors will fuel the emergence, growth and impact of trends in the coming decade. Some will gain singular attention while others will attain only subtle note as part of a larger sweep of change.

In recent interviews with industry leaders, trend experts and practitioners, these ten factors stand out as those that will make a significant mark during this decade and impact our lives, our work and our planet in lasting fashion.

Human Factors

The convergence of technology trends with consumer and industrial customer preferences, interest in human betterment and a new sense of individual empowerment will shape the world significantly over the next forty years.



Being Better: Everyone from Baby Boomers to Gen Alpha will be focused on "being better" with health, wellness, fitness and nutrition for themselves and their families.



Convenience: Time, Usage and Access: A perennial driver of consumer trends since WWI I, the concept of time convenience will be measured in seconds and minutes rather than hours or days. This trend will apply broadly, from on line purchases and package delivery to time required for food preparation and work commuting.



Individual Empowerment: A growing belief in one's personal worth, empowerment and responsibility will blossom and reward the efforts of decades of diversity debates and struggles. Women, Men, African Americans, American Indians, Gay and Straight, Transgender, Youth, Elderly, Citizens and Immigrants will live, work and collaborate with acceptance of one another to a higher degree than in past decades.



Life-Long Learning: A better label will probably emerge in common parlance for continual learning throughout human life and work stages. This need will become an imperative as well as an empowering choice in the new decade.



Personalization and Customization: A prior decade of rising sentiment and experimentation around this topic brings a tipping point to consumer and labor force influence in the 2020-2030 period. Personal choice becomes ubiquitous.



Aging Gracefully: Human life will be lengthened and the quality of life improved in this decade. Advances in biotechnology will bring new meaning to cliches of "70 is the new 50," and other claims to youth.Older generations will hope to work longer while also adapting schedules and lifestyles to mature preferences.



Privacy and Retreat: A clarion call for information privacy and protection rises over the decade, forcing brands to implement greater measures to respond to this demand. Blockchain usage increases as an information security measure for commercial and industrial customers.

INSIGHTS

- HUMAN FACTORS CREATE NEW DEMANDS.
- TECHNOLOGY AND DIGITAL
 TIPPING POINTS BRING PERVASIVE
 CHANGE
- STRESSES ON NATURAL
 RESOURCES MUST BE ADDRESSED.
- ENERGY AND TRANSPORTATION ADVANCES BRING SWEEPING CHANGE TO LIFE AND WORK.
- AMERICA'S GLOBAL POSITIONING EVOLVES.
- ART, FASHION AND DESIGN REFLECT SIGNIFICANT CHANGES IN LIFESTYLES, BELIEFS AND WORK ENVIRONMENTS.
- BRANDS THAT FAIL AT SUSTAINABILITY WILL NOT SURVIVE.
- MANUFACTURING PROCESSES
 MAY ACE BRAND LOYALTY.
- LIFE ON EARTH BENEFITS FROM RENEWED INTEREST IN SPACE.

Being Better: Health, Wellness, Fitness and Nutrition

Everyone from Baby Boomers to Gen Alpha will be focused on "being better" with health, wellness, fitness and nutrition for themselves and their families. 1

This notion will extend to a wide array of applications from fitness equipment and digital apps for tracking personal activities to food purchasing habits.

New scientific discovery and commercial applications will redefine availability of fresh produce. Fabrics that protect people from temperature and sunlight as well as those that promote wellness by warning wearers of environmental hazards such as air contaminants will be incorporated into personal fashion and home furnishings. Fitness and wellness will be incorporated into institutional, commercial, industrial and home architecture and design.

While each of the health, wellness, fitness and nutrition categories has been growing in recent years, the convergence and focus will increase and create powerful influences on personal and business choices in brands, products and services.

The convergence and focus on wellness, fitness, and nutrition will impact everything from personal choices in healthcare services to business facility environments and home design, employee benefit programs, restaurant and grocery offerings, home fitness equipment and personal digital tracking services.

Convenience: Time, Usage and Access

A perennial driver of consumer trends since WWII, the concept of time convenience will be measured in seconds and minutes rather than hours or days. This trend will apply broadly, from online purchases and package delivery to time required for food preparation and work commuting. 2

The desire for ease of operation and use will drive design of commercial, industrial and home equipment, vehicles, packaging of foods and beverages, lawn and gardening tools and personal digital devices. Want to sell baby food? Those single servings better come in pourable containers that can be opened and sealed with one hand.

Convenience will drive the growth and expansion of easy access concepts such as transportation services, ride sharing and vehicle sharing for cars and bikes. The concept of "one stop" will expand to blended service offerings such as co-working facilities that also provide daycare and yoga in the same building, and nursery schools with hair cuts and laundry pick-up services.

The desire for personal convenience is being driven by two factors: (1) the world is moving faster, so people feel as if commodity tasks are leeching time from their day, and convenience factors allow them to recover some small slivers of time for work or play; and (2) because we can – life is difficult, so if in some small measure we can make things easier for ourselves or others, why not?

John Goodman Vice Chairman, CCMC



Trend Expert

"Don't underestimate the role of customer experience in B2B."

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Individual Empowerment

A growing belief in one's personal worth, empowerment and responsibility will blossom and reward the efforts of decades of diversity debates and struggles. Women, Men, African Americans, American Indians, Gay and Straight, Transgender, Youth, Elderly, Citizens and Immigrants will live, work and collaborate with acceptance of one another to a higher degree than in past decades. 3

This trend does not mean the end of discourse, but rather a move toward individual confidence in unique or minority characteristics and a growing acceptance of diversity.

Gender neutrality will be visible in new ways such as the design of children's toys and adults' clothing. Toys will reflect greater ethnic diversity and encourage boys and girls to pursue all kinds of career interests. Tailoring and clothing designs will be driven by personal size, shape and preference more than by gender. 4

Personal profiles will be viewed based on skills and personal contributions rather than on positions of power or rank. Traditional barriers to diversity will ease and acceptance broaden. The resulting human landscape will change in neighborhoods, workplaces, schools, places of worship, shopping venues, entertainment casts, and social organizations.

The growing sense of individual responsibility will mean that individuals will be more prone to take action on behalf of themselves, their families, their jobs, and their beliefs and causes.

Life-Long Learning

A better label will probably emerge in common parlance for continual learning throughout human life and work stages. This need will become an imperative as well as an empowering choice in the new decade. 5

The rate and scope of change in the world will be such that individuals must continue to learn and adapt in order to successfully pursue their lives, their work and even their entertainment. Coupled with a rising interest in pursuing new ideas, new hobbies and new job skills, this trend aligns with the Being Better trend.

A large impact will be felt in the 2020-2025 timeframe by the existing labor force as individuals work to adjust to smart automation and technology and digital tools. Adaptation around these capabilities will continue as new advances emerge.

As part of this trend, credentials will shift to reflect the importance of both academic degrees and skills attainment. In the workplace, progression through a series of technical skills levels will be an important career component.

Education institutions will broaden and shift their offerings to support this trend. Skills certifications will take on greater recognition alongside academic credentialing. 6

Companies and industries will invest in training programs to meet a growing need for workforce skills in specific technical areas. Opportunities for industry collaboration in these efforts will abound.



Personalization/Customization

McDonald's was way ahead of its time with the "have it my way" campaign. The slogan serves this decade well in describing the ways consumers will make transactional, work and lifestyle decisions in the future.

Since the beginning of the 21st century, we've seen a rising desire for personalization. The coming decade will see a tippling point of influence emanating from that trend. Personal choice will become ubiquitous, not only among consumers but in the labor force as well.

This perspective will drive consumer and workforce choices in the ways people want to get information, what services they use, and how they approach their daily schedules. Impacts will be felt in personal decisions about what time of day they want to work and play, what entertainment programming they prefer, and how they want to interact with health care providers, schools, employers and retailers.

Personal preferences will drive transaction decisions in far-flung ways, from selection of purchase channels to decisions on how and when package deliveries will be received. 7

Aging Gracefully

Human life will be lengthened and the quality of life improved in this decade. 8 Advances in biotechnology will bring new meaning to cliches of "70 is the new 50," and other claims to youth.

Older generations will hope to work longer while also adapting schedules and lifestyles to mature preferences.

Pressures will mount on families and healthcare facilities to care for older members of the population. Legacy wealth will be consumed as healthcare costs escalate to cover needs and longer timeframes.

Technological advances will support physical frailties in new ways, enabling longer work lives, independent living, and safer mobility and physical activities.

Privacy and Retreat

A clarion call for information privacy and protection rises over the decade, forcing brands to implement greater measures to respond to this demand. Blockchain usage increases as an information security measure for commercial and industrial customers. 9

As the pace of life increases in work and personal environments, people want greater personal privacy, including spaces and experiences that offer retreat. 10 Office environments built around open space concepts will need to add privacy areas for focused, quiet work or periodic personal escape.

The home and hospitality design industries will reflect these preferences, offering retreat environments to complement fitness, sports and adventure activities at the opposite end of the spectrum.

"Fast-Fashion's future of sustainability," Focusing Future



Technology

Smart automation and digital tools will be pervasive and will enable improvements in quality of life, industry, science and commerce. 11

Man + Machine: The man + machine relationship will become accepted in work and life environments. Practical applications will multiply, coming to bear with appreciable value after a decade of trials, resistance and doomsday predictions.

Convergence: A tipping point of engineering and digital capabilities, consumer preferences, industrial needs and scientific interests will spur use, adoption, and further advancement of technology.

Artificial Intelligence, IoT and Advanced Computing: These three technologies will rule the decade, fueling equipment development, product design, smart automation, telecommunications, robotics, transportation innovations, and environmental design.

Satellite Communications and Broadband: Enablers in the best of senses, these two technologies will open markets, speed innovation and connect people in new ways around the globe.

Moving from single structures to constellations, while shrinking in size and cost, satellites will provide increasing value in a variety of fields, from climate monitoring, communications, and digital network capabilities to vehicle navigation services and medical collaboration.

Broadband will continue to progress over the decade, both in coverage and capability. The emergence of true 5G offerings in a handful of cities at the beginning of the decade will spread to national coverage of large and medium-sized urban markets. The hope for greater rural access to broadband capabilities will be realized, at least for locations able to support some commercial and industrial activities.

Robotics: The field of robotics will achieve new levels of acceptance with the advance of commercial capabilities, greater flexibility in installation parameters, and improved knowledge and training of the workforce.

Augmented Reality, Virtual Reality and Neurotechnology: Advances in AR, VR and neurotechnology will create significant changes in communication among people at work and in the world at large. These emerging technologies have the potential for significant impact in collaborative processes in manufacturing and logistics by the end of the decade.

Emerging today in industries such as healthcare, entertainment, education and transportation, these capabilities will enable collaboration, learning and training, navigation and digital competition among people in close proximity as well as those separated by global geography.

Devices: Connectivity will rise over the decade through new and innovative wearables, surfaces, screens, textiles and other materials. Device costs will drop as sales increase. Portable devices will enable rapid adoption of technology in emerging economies.

Case Study: "Meylah brings Smart City Tourism IoT solution to Grays Harbor with help from Microsoft, HPE, and other partners," Microsoft



Natural Resources

Stress on natural resources will increase, especially on water, critical minerals, forested lands and green space.

Growth and Migration: Global population growth will bring new demands for water filtration, land development, water, sewer, road and power infrastructure, and transportation systems, all of which impact natural resources. 12

Urban migration will require added housing and commercial infrastructure, further reducing green space and forested lands. Water resources and energy sources will be further taxed as a result. 12

Critical Minerals: Critical minerals are needed for core technologies for solar and wind energy generations, energy storage and batteries for electric vehicles (EVs). 13

Minerals Used by Technology Type



Source: Data from CSIS, Graphic by Burchette & Associates

Center for Strategic & International Studies (CSIS)

CSIS Brief: Critical Minerals and the Role of U.S. Mining in a Low-Carbon Future

Demand for these minerals is expected to increase sharply during this decade. The Center for Strategic & International Studies (CSIS) predicts that under a 2-degree climate warming scenario, demand for all of the relevant minerals in electric storage batteries is expected to increase by over 1,000 percent.

The CSIS also notes that in 2020 the United States is absent from many of the global supply chains for these critical minerals, making it imperative for the country to identify new ways to secure needed domestic supply to fuel needs of the future.

Recycling: Recycling can contribute to resource availability in the U.S. but critical mass hurdles must be resolved. As new technologies reach scale such as lithium-ion batteries for EVs, end-use processes will be developed to leverage the components and materials. 14

Energy

Trends surrounding energy will have profound effects on life in the coming decade. Progression from age-old generation capabilities coupled with advances in newer technologies will transform energy usage and create positive impacts on world climate and sustainability in a variety of ways. 15

"In the future electricity system, having to buy fuel will be a disadvantage."

New Energy Outlook 2019, BloombergNEF

Wind and Solar: Decarbonization of world economies is progressing at a promising rate. Solar, wind and batteries will be the new drivers of the electricity sector over the next 30 years.

America will have continued growth in renewables and gas over the decade with these becoming the country's primary source of power generation. (Bloomberg NEF)

Batteries and Photovoltaic Systems: Growth in adoption of electric vehicles (EVs) for consumer, commercial and government use will lead to a rapid rise in battery usage and advancement of battery technologies over the decade. Demand for batteries for EVs will drive down the costs of batteries for other applications.

Businesses and households will invest significantly in behind-the-meter photovoltaic (PV) and battery systems. BloombergNEF estimates the payback period for a PV plus battery system will halve over the next twenty years, from 13 years today to 6 years in 2040.

Electricity: Population growth coupled with development of emerging economies will increase demands for air conditioning. Electric vehicles (EVs) will add significant electric demand in the U.S. by 2050.

Technology: Sensors and improved machine efficiencies from AI will drive down commercial energy usage and improve costs.

Infrastructure: Construction of infrastructure for solar and wind generation and storage will increase, bringing new hardscape to urban and rural areas.

BloombergNEF

BloombergNEF predicts: "By 2032 there is more wind and solar electricity in the world than coal-fired electricity."

BloombergNEF: New Energy Outlook 2019

Transportation

Already in transition, the transportation industry will undergo massive transformation and restructuring over the next twenty years. 16



Consumer Vehicles: Personal vehicles will reduce in number, due to the rise in passenger transportation services overall and improvements in public transit systems in urban areas.



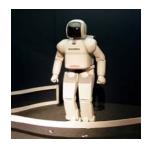
Electric Vehicles: Expect to see a dramatic rise in EVs in all sectors. Households, businesses and public transit systems will transition to EVs with a rapid adoption curve between 2020 and 2040. Charging station infrastructure will multiply to support longer distance travel and convenience. 17



Delivery Services: Delivery of retail packages and commercial freight will continue by road vehicles, but a rise in use of delivery drones in some sectors will segment the market. 18 A significant rise in food delivery services will come from supermarkets as well as food preparation companies. 19



Drones: Urban Air Mobility (UAM) comes of age in this decade with a dramatic increase in use of drones. Delivery and surveillance drones will have the greatest growth. Passenger drones, sometime referred to as "flying cars," will gain acceptance but will be limited for some time by weight, energy sources and distance barriers. 20



The Last Fifty Feet: Much research, trial and effort will continue over the decade to determine the best approaches and develop the most effective technologies to support the last fifty feet of freight delivery. Autonomous vehicles, robotics, public and private parcel systems, digital and dynamic delivery scheduling and other tools will be honed in the process.



"High-speed rail can serve as an alternative to short-distance air travel, and conventional and freight rail can complement other transport modes to provide efficient mobility."

The Future of Rail, IEA



Infrastructure: Many roads, bridges and tunnels in the U.S. need attention and will require public investment over the decade.



Maritime Shipping: Port authorities on all U.S. coasts will continue investing in deeper channels, robotic stevedoring and specialized warehousing facilities to expand capabilities for global and domestic trade. The move toward automation will continue the reduction in manual labor at ports that began with the shift to containerization in the 1960s. 21



Spaceports: Spaceport development will increase in support of the rise in launch, recovery and related space industry activities. 22



Rail: Investments in rail infrastructure in the U.S. will support growing passenger and freight needs as well as address increased interest in lowering CO2 emissions. 23



The evolving positioning of the United States on the global stage will both propel and limit the domestic economy. 24

A return to domestic manufacturing in some sectors warrants close tracking as reduced costs and shorter supply chains to domestic customers promises increases in profitability and greater control over supply chain logistics.

Made in the USA will always be popular at home, but the acceptance of products manufactured around the globe will continue to grow as those products fuel demand, improve in quality and provide unique benefits.



Increased economic strength across Asia represents a potential for loss of U.S. market share and profitability in international trade.

A polarized media will continue to fuel domestic conflicts over race, religion and ethnicity. The impact of this diversity of opinion will be mitigated in part by more inclusive Gen Alpha youth emerging into adulthood toward the end of the decade.

Art, Fashion and Design

Art is the reflection of life. In that realm the world will see itself in an age of rapid change, with a dichotomy of old and new opinions and approaches.

As art and design are age-old mediums for engaging discussion and creating debate, artists and designers will bring a clarion call for thinking about the present and the future via various mediums. The evolving environment will be well suited for those so talented to take on roles as instigators, mediators and facilitators of change.

Fashion design will reflect a greater adoption of gender-neutrality and diversity. New materials and protective finishes will appeal to consumers' interest in health and well-being.

Clothing will incorporate technology with accommodations for wearables and embedded smart fibers.

Industrial wearables for technologies such as AR and neurotechnology will become lighter weight, more comfortable, less obtrusive and allow greater integration with other processes.

Convergence of art and technology will bring exciting new experiences through new applications of augmented reality, virtual reality and digital surfaces.

Architecture and home and office design will reflect a global influence, with a local focus. Preferences for personal privacy and retreat will dictate new layouts in space usage and materials that convey quiet ambiance.

Gudy Herder, founder of Eclectic Trends and an international trend expert, says "Silence has become the new luxury in many cities." She expects noise-reduction pods/booths for offices to be implemented in public spaces. Herder believes future design preferences will include a focus on acoustic collections. "3D woven fabrics absorb and reflect sound waves much better than flat textiles contributing to a more muted environment," she says. 25

Technology will be a driver of design in many settings. 26 Richard Petersheim, partner and landscape architect at LandDesign says, "By 2030, a lot of technology will be incorporated into designed spaces. Augmented reality, advanced conferencing, digital walls, embedded sensors and other types of communication devices will be in use. New materials will allow walls to display information. AR will let you overlay information on real settings and new types of small wearable devices will facilitate communication." 27

Augmented Reality App:MariposaAR: Code the Dream for Google Fiber



"What Will Fashion Be Like 20 Years from Now?" by Bel Jacobs for BBC



What will fashion be like 20 years from now?

Richard Petersheim, Partner and Landscape Architect, LandDesign



"Design is driven by how people want to live and work.... We have to design for today and the future.... It is important for design professionals and their clients to be looking at future trends and how people will want to use spaces for the long-term."

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Petersheim advises firms to think strategically about their technology plans and how changes may require adaptation of the work environment. "A big part of the job in designing industrial spaces in the future will be to map out the technology and the communications."

Across all design topics, trend experts are aligned on the concept of greater integration of technology into life and work spaces. A futuristic example is the "woven city" project announced by Toyota and Bjarke Ingels (BIG) that imagines new forms of urban life. Bjarke Ingels, founder and creative director at BIG says, "A swarm of different technologies are beginning to radically change how we inhabit and navigate our cities." He views this as an exciting design opportunity. "Connected, autonomous, emission-free and shared mobility solutions are bound to unleash a world of opportunities for new forms of urban life," he says. 28



"Toyota to Build Bjarke Ingelsdesigned 'City of the Future' at the Base of Mount Fuji," designboom

Sustainability

No longer viewed as optional, proactive efforts to use sustainable practices in business will be a powerful driver of choice in this decade. Brands that fail at sustainability will not survive.

Consumers' participation in supporting sustainability will increase, demanding similar practices by public entities and businesses.

Consumers and companies will consider the level of sustainable materials in products when making purchasing decisions. The environmental impact of using products and services will also be important. Brands will be held responsible for their extended supply chain impacts, not simply end-product features.

Gen Alpha children will grow up with sustainability practices such as recycling and use of biodegradable materials being a part of everyday life at home, school and even on the playground. This engrained perspective will fuel this generation's focus on sustainability as they enter the workforce at the end of the decade.

We have 10 years to save Earth's biodiversity as mass extinction caused by humans takes hold, UN warns



By Jessie Yeund, CNN

Recent research indicates an increase in the number of major global and U.S. companies that are more aware, engaged, and committed to addressing sustainability throughout their business processes. 29 So says Richard Mattison, CEO of Trucost, a research and publication partner with Green Biz Group for the State of Green Business 2020 report.

"These companies have never been more focused on sustainable business," Mattison says. He finds an increasing number of senior executives are engaged around this issue and more companies are making their commitment goals public.

Financial markets are paying attention as well. Mattison notes that \$30.7 trillion in assets under management are run according to sustainability objectives and financial market regulators are showing significant interest in aligning capital flows with sustainability outcomes.

In the report, Jerry Makowitz, chairman and executive editor at Green Biz Group also casts a positive light on business trends for addressing sustainability in the future. He writes that "nature's feedback loops and other indicators are worrisome....What gives us hope is that companies around the world are moving more quickly than ever to reduce the business risk that comes with these threats to natural capital and human well-being."

Manufacturing Process as a Brand

Smart automation brings a new twist to the manufacturing process.

Today, a growing number of consumers view "made by" processes as more important than the geography of origin or the brand that manufactures the goods. A component made by a specific smart automated process is becoming a commodity in the eyes of the buyer. 30

How will brands compete when "Made By RoboticBlue" supersedes "Made by the Acme brand"? The combination of the manufacturing process with other factors such as sustainability, packaging, convenience and cost will be key differentiators.

Race to Space

Renewed interest, investment and commercialization of the race to space will fuel significant progress in a myriad of space-related activities. Life on earth will benefit from new knowledge, new processes, new materials and new capabilities.

Commercial and government-funded initiatives in space will increase throughout the decade, attracting participation from countries around the globe in launch, recovery and associated manufacturing, mining, research and support activities.

Maybe we'll even get something as fun as Tang and space blankets this go around.

For more on this topic, go to New Space Economy.

Joel Makower Chairman and Executive Editor, GreenBiz Group



"The trends reflect the potential of sustainable business: to create value for all society, balancing people, profits and the planet."

State of Green Business



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"Supply chains to infinity and beyond: interview with Mark Wiese," by David Maloney for DC Velocity



Convergence

The convergence of market forces, trends and innovations will drive progress over the next two decades.

Business trends, consumer preferences and global needs will impact life and commerce.

Our connected world will allow material handling, logistics and supply chain players to rapidly address challenges and opportunities and learn from one another to achieve sector success

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Report Credits

The "Transformation Age, Shaping Your Future" report site offers information and dialogue on long-term industry trends for the material handling and logistics industry. As such, the information contained within serves as an invitation to engage in thought and discussion about key factors that are expected to drive, fuel and impact various aspects of life, commerce and industry in the coming decade.

Much of this information was gleaned from in-depth interviews with industry leaders and trend experts. Other data was obtained from secondary research of published material on specific topics. The combination provides insights into those forces that will impact the industry and, more importantly, the implications for action needed now and in the future by company leaders and their teams.

We wish to express thanks to all who gave their time and shared their experience, expertise and opinions for this report. The report and website were developed by Burchette & Associates, Inc. for MHI.

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