

what's NEXT?

MAJOR TRENDS THAT WILL INFLUENCE OUR INDUSTRY



A LOT HAS CHANGED IN A DECADE. When Rockwell Collins spun off from Rockwell International and started trading shares on the New York Stock Exchange in 2001, our company didn't offer business jet cabin solutions, for example, or integrated systems for ground vehicles. Suitcase-size satellite communication equipment, virtual environments and unmanned aircraft systems weren't as common as today. And when employees talked about "tweets," you assumed it was a noise a bird made, not a way to communicate with a colleague.

Over the last 10 years, companies around the world have made exponential advances in knowledge and computational capabilities, and Rockwell Collins is no exception. Today, our company's breakthroughs in GPS technology, communication capabilities and avionics are supporting U.S. and coalition forces deployed around the world. In addition, an extensive fleet of aircraft — including business jets, regional aircraft and airliners, as well as military tankers, transports and rotary wing platforms — is flying safer and more efficiently with Rockwell Collins' next-generation capabilities.

With one decade behind us, it's a good time to ask, "What's next?" While no one can predict the future with certainty, a look at global drivers of change and macro-level trends often provides a glimpse of the changes coming in the aerospace and defense industry. In the next pages, you'll read more about the underlying forces shaping our business environment and the anticipated effects.

Editor's note: There are a number of classifications for developed and developing countries. For the sake of simplicity, in this article, developed countries are defined as all nations in Europe and Northern America, plus Japan, Australia and New Zealand. The remaining nations of the world are classified as developing countries or emerging countries.

Global drivers of change

Population

By the end of 2011, the world's population will be about 7 billion, and by the late 2020s, it's projected to be 8 billion, according to the World Bank. By comparison, in 1800, the world's population was only 1 billion.

Demographers expect the largest increases in population out to 2025 will be in Asia and Africa, while less than 3 percent of the growth will occur in Europe, the United States, Canada, Australia and New Zealand, according to the U.S. National Intelligence Council. India will experience the largest increase in population over the next 15 years — climbing by about 240 million people — with an estimated population of 1.45 billion in 2025.

Additionally, most nations are experiencing some type of growth in their older populations. While the level and pace of population aging vary by geographic region, declining fertility rates and improved health and longevity — especially in developed countries — have resulted in rising numbers and proportions of the older population. In 10 years, for the first time ever, people around the world aged 65 and over will outnumber children under age 5, according to the U.S. National Institute on Aging and the U.S. Department of State.

These changes in demographics will drive social and economic opportunities for some countries while challenging others.

Economics

Economists are seeing the most significant global shift in modern history — roughly from west to east — in relative wealth and economic power. As the working-age population decreases and overall population growth slows in developed countries, economic growth also is projected to wane. In contrast, in developing countries, more labor, along with more capital for investment, is expected to fuel growth.

It's anticipated that the economies in the U.S., Germany, the United Kingdom and France will continue to be among the largest in the world over the next decade. Yet, rapidly developing countries such as India and China are expected to play dominant roles in the global economy. Already, within the last

year, China surpassed Japan as the world's second-largest economy.

In addition, the number of people considered to be in the “global middle class” will rise dramatically. A report from Goldman Sachs found that the global middle class would expand from 29 percent of the world population in 2008 to about 50 percent in 2030. Most of these entrants will be from Brazil, Russia, India and China where well-developed industrialization strategies are in place. A rising middle class means more demands for higher-end goods and services, including air travel. More national wealth also increases a country's ability to fund defense programs.

Resources and Environment

With rising population and a larger middle class with more affluent lifestyles, demands for natural resources such as water, food, oil, lithium, gold, iron and copper are projected to increase. More demand will disproportionately increase the prices of limited resources and also heighten tensions on the world stage as countries compete for sources of supply. Major exporters of critical resources like oil — such as Brazil, Russia and countries in the Middle East — will have more

financial resources to increase their economic influence through control of supply and by leveraging increased investment in defense.

In turn, an escalation in demand for natural resources also means an escalation in waste and pollution, which negatively impacts the environment. Since the environment influences how people live and countries develop, most societies naturally will seek balance between economic and environmental priorities.

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Geopolitics

As developing countries such as Brazil, Russia, India and China accumulate more wealth, these countries also will accumulate more political clout. While it's believed the U.S. will continue to have a strong influence on the international system over the next decade, a scenario where there are several powerful players on the world stage is starting to take shape. Some of these emerging players follow models different from the U.S. and other Western countries. For example, China has a system of "state capitalism" where the government owns firms and plays a prominent role in economic development.

Aging and population change also will have geopolitical implications over the next decade. Historically, older societies tend to be more stable, while societies with "youth bulges," or high ratios of youth compared to the adult population, are most susceptible to civil unrest, revolutions, terrorism and war. While youth bulges don't solely contribute to chronic unrest — poverty, corruption, ethno-religious tensions and political instability also may contribute — many strategists see correlations between extreme youth ratios and violence.

The uprisings in Tunisia, Egypt, Libya and other North African and Middle Eastern countries are recent examples of this correlation. In Tunisia, 5.3 million people — or about half of the total population — are under 30, according to the United Nations



Large numbers of youth are behind the recent protests for change in North Africa and the Middle East. Political demographers warned years ago that as fertility rates climbed in the area, "youth bulges" could lead to civil unrest if employment, homes and overall prosperity didn't improve.

Population Division. While the fertility rate is falling in this country and in others in the region, a more balanced age demographic in North Africa and the Middle East — and overall stability — probably won't be reached for another decade.



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Technology

It's estimated that there will be greater technological change over the next two decades than in the entire 20th century if the current pace of technology advancement continues.

Just think about some of the technologies that have matured over the last decade alone — smartphones, digital music players, social networking, voice over IP, flat-panel TVs, commercial GPS, digital photography, unmanned aircraft systems and LED lighting.

While the U.S. is expected to continue to be a leader in science and technology over the next 10 years, other countries are catching up when it comes to innovation leadership. For example, in China, the mastery of science and math fundamentals is already exceptional. With the advancement of other areas that contribute to innovation — such as creativity and application — the innovation leadership gap is expected to narrow.

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LOOKING AHEAD



10 TRENDS
THAT WILL
INFLUENCE
OUR INDUSTRY
OVER THE
NEXT DECADE

Demand for mobile connectivity anywhere and at anytime

Global
drivers
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One of the greatest advances over the last decade has been the expansion of mobile

connectivity. In the consumer marketplace, web-enabled devices with voice, data, streaming video, the Internet and GPS navigation have made it easy to access information and communicate with people around the world.

These technological advancements also are transforming the aerospace and defense industry. Already, terrorists and other adversaries are using simple connectivity to communicate and transfer knowledge with alarming rates of success. For warfighters to combat these groups, they will need unprecedented intelligence information via seamless networks that ensure the right information gets to the right person at the right time. Additionally, warfighters who use web-enabled capabilities via smartphones and other devices at home want that same connectivity while deployed. Yet, to use these technologies for defense, additional security to prevent interception or jamming by adversaries is needed.

In commercial aviation, passengers will expect to have the same connectivity in the cabin of an airplane as they currently experience on the ground. Also, aircraft owners and operators who can instantly access the intelligence they need to manage flight operations, maintenance and passenger services will be able to provide more efficient and cost-effective services.



Artificial intelligence and autonomous systems coming of age

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Just as mobile connectivity has changed the way we communicate and collaborate, artificial intelligence and autonomous systems are likely to change the way we make decisions and use technology. Already, you can find examples of autonomous technology in aircraft and ground vehicles — even vacuum cleaners. These “intelligent” systems are capable of making decisions and interacting with the real world through the fusion of sensing, processing and communications.

Over the next decade, there will be more emphasis on engineering systems that can assess foreseen and unforeseen circumstances, and automatically respond or present high-level choices to human operators. For example, in aviation, the demand for more fuel-efficient aircraft, along with greater levels of precision, consistency and safety, is leading to new levels of automation and autonomy in flight decks. Breakthroughs in these technology areas also are helping advance unmanned aircraft systems.

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Increasing air traffic congestion

Global
drivers



Demand for world air travel has increased an average of 5 percent annually over the past 20 years according to the International Civil Aviation Organization. That trend is expected to continue, meaning in about 15 years, global air travel will double. Developing countries will see the most growth — especially in the Asia Pacific region. Yet, Europe and North America will continue to be among the regions with the highest volume of air travel and the most airspace congestion. For instance, according to the Federal Aviation Administration, the U.S. airlines are expected to reach the one billion passengers-per-year mark by 2021, two years earlier than previously expected, making the need for more capacity in the air traffic management system even more urgent.



Implementing a seamlessly interoperable global air traffic management system — as proposed in the Federal Aviation Administration's NextGen strategy and EUROCONTROL's SESAR strategy — over the next decade would minimize delays, save fuel, and allow more aircraft to operate safely in the same airspace. Information technology and avionics components are important parts of the solutions identified in these strategies. For example, Automatic Dependent Surveillance-Broadcast, or ADS-B, uses satellites, transmitters and receivers to supply flight crews and ground control personnel with information about the position and speed of aircraft in the area. As the illustration above shows, this new technology provides more accurate tracking and more frequent updates than current radar surveillance.

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Shifting global defense spending

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Changes in trends such as demographics, economics, resources, the environment and technology can easily influence the world's security. Yet, when strategists look at global defense spending, they have to consider the economic strength of a country to build military forces along with the possible threats to its security.

Overall defense spending is projected to be flat to decreasing in the United States and western Europe in the next five years as governments focus on tightening spending. While strategists foresee some growth in defense spending in these developed countries in the latter half of the decade, it's expected to be modest. As a result, more emphasis on upgrades, service solutions, "good enough" technologies and capabilities with lower price points is likely.

On the other hand, defense spending will become more of a priority in areas with growing national wealth such as Brazil, Russia, India and China. Over the next decade, these countries will be making defense investments to position for leadership on the world stage. According to the United States Joint Forces Command, in two decades, with the emergence of the developing countries, every region of the world will likely contain major economic powers or organizations capable of leadership to address regional troubles.

The economic importance of the Middle East with its energy supplies, combined with tribal, religious and political divisions, will continue to have implications on security. Additionally, youth bulges, intermixed with the fact that much of the Middle East and North Africa has fallen behind in industrialization, modernization and education, provide conditions for multiple or simultaneous regional conflicts over the next decade. And, if that were not enough, radical Islamists in the region who advocate violence add to the tension. These challenges, while not new, have a global reach. Over the next 10 years, as conflicts persist, it's expected that security leaders will continue to deliberate the role military force has in international affairs in this region of the world.



For the first time in modern history, economists are seeing a shift roughly from west to east in economic power. Rapidly developing countries such as China are expected to play dominant roles in the global economy over the next 10 years.

More partnerships between companies in developed and developing countries



As economic power shifts, most multinational aerospace and defense companies are looking at ways to move into new markets and expand their current market shares to maintain long-term growth. At the same time, governments and companies in developing countries are trying to advance design, manufacturing and certification capabilities to benefit their local economies in the long term.

As a result, over the next 10 years, it's likely that there will be more partnerships in the industry — many in the form of joint venture agreements — between companies based in developed and developing countries. A recent example is the COMAC C919 program. China's government-owned aerospace manufacturer — Commercial Aircraft Corporation of China (COMAC) — asked foreign-based suppliers to establish close relationships with Chinese companies through joint ventures. In a joint venture, both companies have a stake in the business and must learn how to work together to achieve their mutual interests.

Competition becoming more global



Today, most of the major aerospace and defense companies are based in developed countries. Yet, within the next 10 years, other global competitors are expected to emerge, especially in developing countries such as Brazil, Russia, India and China.

These new companies could dramatically shape our industry. Many of the emerging countries have experience providing high-value products at a very low cost. As customers in developed countries look at ways to cut expenses over the next decade, these new companies' value propositions are likely to be very attractive on a global scale.

The emergence of government-controlled companies in countries like China and Russia also could have implications on our industry's competitive environment. Since the distinctions between public and private are blurred under state capitalism, governments can manipulate local market outcomes for national purposes and provide large flows of capital. Successfully established companies will develop partnering strategies to leverage this reality.

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The number of people considered to be in the global middle class is expected to rise dramatically in the next 10 years. Most of these entrants will be from developing countries like India. A rising middle class means more demands for higher-end goods and services, including air travel.

Talent pool becoming more global

Global drivers



Over the next decade, it's expected that emerging countries

— especially India and China — will play more significant roles in the development of advanced technology. Increases in population, rising wealth, and investments in education in these countries will provide momentum when it comes to innovation leadership. As multinational companies look at ways to expand market share, maintain competitiveness, and strengthen technological innovation, employing talent in developing countries and establishing multinational teams will be key.

Advancements in connectivity over the last decade mean companies can work more efficiently from nearly anywhere in the world. A multinational team working collaboratively often can develop innovative solutions in less time and for less cost. This type of differentiation will be important in a more competitive global marketplace. At the same time, customers typically prefer to work with local businesses. For companies to expand in developed and developing markets, more local employees serving local customers will be essential.

Continuing demand for green technologies



How can we reduce materials? How can we better specify materials?

How can we better dispose of materials? How can materials reduce weight? How can materials improve efficiency?

Concerns about the environment and natural resources, along with the acceleration of environmental policies at government and regulatory levels, are compelling customers and other groups to ask these questions when making buying decisions. As overall waste and pollution rise over the next decade, stakeholders will expect companies to understand and address environmental challenges — even if it increases the cost of doing business.

As stakeholders demand more solutions that save resources and cut down on pollution, green technologies will continue to be important. In our industry, the development of more fuel-efficient aircraft is just one example of how companies are using innovation to minimize environmental impacts.

Innovation strategies will become more of a science than an art

+  Global trends have put innovation front and center with increasing needs for new products for new and existing market segments. Yet, traditional approaches to innovation — looking at customer-defined needs, benefits, specifications and solutions — may not be enough to remain competitive in the future.

As competition becomes more global, it's anticipated that there will be more focus on differentiation, cost competitiveness and time to market. At the same time, as global population shifts occur, and as technology continues to enable new capabilities and new jobs, people's wants and needs also are expected to change. Therefore, to develop more successful solutions in less time and with less cost that precisely target these changing markets, innovation strategies will become more of a science than an art.

This means mathematically predicting the outcomes customers want to achieve and systematically identifying opportunities that more precisely target those desired outcomes. To do this, companies may need to rethink market research, how ideas are generated, how concepts are evaluated, and the design process. It also may mean the responsibility for devising the end solution shouldn't lie so heavily upon the customer's knowledge of what is possible. Instead, it's up to researchers and developers to gather insight from the end user in order to understand and achieve the end user's mission.

Increased focus on a broader set of stakeholders

+  Over the next 10 years, it's expected that politics and political motivations will be injected into global markets on a scale that hasn't been seen since the Cold War. As wealth moves roughly from west to east, more of it will be concentrated under state capitalism systems. In addition, the recent financial crisis has led to massive government interventions in economies in both developed and developing countries.

While political intervention can be good for business — better crafted rules and regulations can improve the flow of cash, goods and services — it can also have negative implications for businesses. Governments can limit trade and investments and change the competitive landscape with subsidies.

The increasing role of the government as a player in economics means companies will need to build trust and communicate with a broader set of powerful stakeholders. Stronger relationships with local stakeholders in served markets — customers, politicians, suppliers, media, union leaders and other people in the community — will be important in order to increase brand value, attract and retain talent, and remain competitive. ■

Share your thoughts — 10 trends in 10 years was developed by the *Horizons* editorial team and Rockwell Collins strategists to inspire employees to think about the future. If you have questions about these trends or additional insights, email empcomm@rockwellcollins.com.

Learn more

Is your curiosity piqued by these trends? Here are a few sources to learn more:

- **The National Intelligence Council's 2025 Project**
www.dni.gov/nic/NIC_2025_project.html
- **Center for Strategic and International Studies**
<http://csis.org/>
- **An Aging World**
<http://www.census.gov/prod/2009pubs/p95-09-1.pdf>
- **The Expanding Middle: The Exploding World Middle Class and Falling Global Inequality**
<http://www2.goldmansachs.com/ideas/global-economic-outlook/expanding-middle.pdf>
- **United States Joint Forces Command — Joint Operating Environment**
http://www.jfcom.mil/about/fact_joe2008.html
- **Airbus — Global Market Forecast 2010-2029**
<http://www.airbus.com/company/market/gmf2010/>
- **Boeing — Long-term Market Forecast 2010-2029**
<http://www.boeing.com/commercial/cmo/>
- **Aviation Outlook: ICAO Environmental Report**
http://www.icao.int/icao/en/env2010/Pubs/EnvReport2010/ICAO_EnvReport10-Outlook_en.pdf

