



Massachusetts 2030: Collaborating to propel growth and development through emerging technology

A public policy roadmap for governments

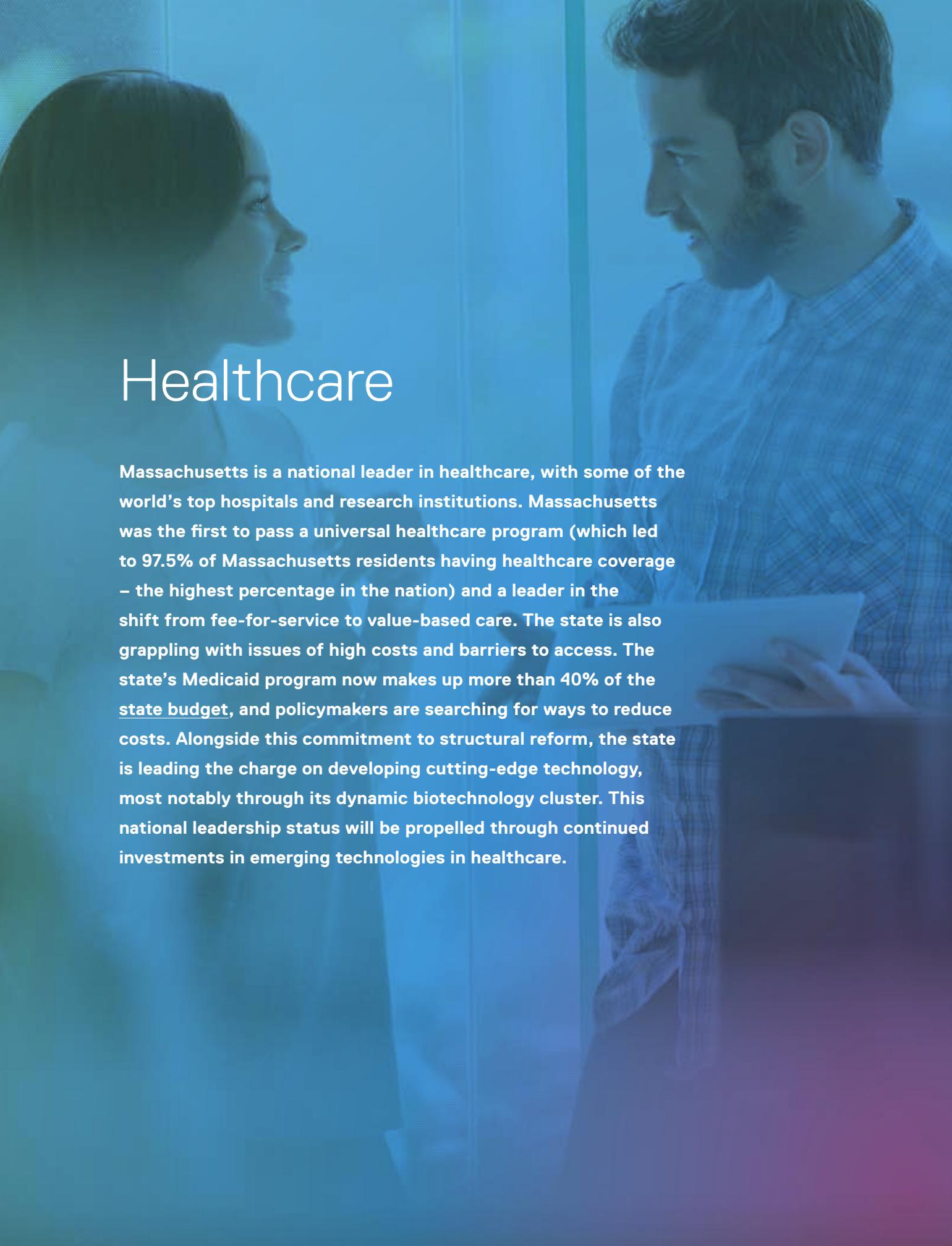
Overview

As a shining example of social and economic growth and potential, the Commonwealth of Massachusetts has a significant edge over many of the world's most attractive and vibrant destinations to live and work. Supporting the continued adoption and expansion of emerging technologies will be critical to maintaining this leadership position and enviable growth trajectory. From cloud computing, 5G, artificial intelligence (AI) and machine learning to augmented and virtual reality, robotics and blockchain, this adoption of more developed technology and exploration of newer ideas will require focused and sustained collaboration between government, private, and nonprofit organizations. As we embrace and adopt these technologies, we also must ensure that people are equipped to realize their benefits across every aspect of work and daily life.

The sky remains the limit for Massachusetts, in part due to its treasured resources, including a large number of the world's most innovative institutions. While the ceiling appears nowhere in sight, we must make every effort to anticipate and navigate around any potential roadblocks. As a global leader in applying emerging technology to drive human progress, Dell Technologies is committed to helping unify and implement Massachusetts' multitude of resources to advance the state's place as a showcase example for applying emerging technologies to advance healthcare, education, workforce readiness, sustainability and manufacturing.

Considering applications in key policy areas

1. Healthcare
2. Education
3. Workforce readiness
4. Sustainability
5. Manufacturing



Healthcare

Massachusetts is a national leader in healthcare, with some of the world's top hospitals and research institutions. Massachusetts was the first to pass a universal healthcare program (which led to 97.5% of Massachusetts residents having healthcare coverage – the highest percentage in the nation) and a leader in the shift from fee-for-service to value-based care. The state is also grappling with issues of high costs and barriers to access. The state's Medicaid program now makes up more than 40% of the state budget, and policymakers are searching for ways to reduce costs. Alongside this commitment to structural reform, the state is leading the charge on developing cutting-edge technology, most notably through its dynamic biotechnology cluster. This national leadership status will be propelled through continued investments in emerging technologies in healthcare.

Role of Emerging Technologies

Widespread adoptions of emerging technologies are already revolutionizing Massachusetts' healthcare sector by expanding providers' capability and reach. New technologies will be used to deliver cost-effective and innovative solutions to overcome gaps in health infrastructure and emerging public health challenges – supporting the state's continued efforts to cut costs and improve access.

AI and Machine Learning: Early indications show that AI and ML already are beginning to transform the healthcare industry. Some predict that AI could save \$150 billion per year in healthcare costs nationally. Hospitals will incorporate AI technology into all aspects of patient care to streamline processes, improve quality, and cut costs. AI ultimately will transform healthcare -- from enabling more precise, personalized and safe medical care, to making population risk assessments, to identifying insurance fraud.

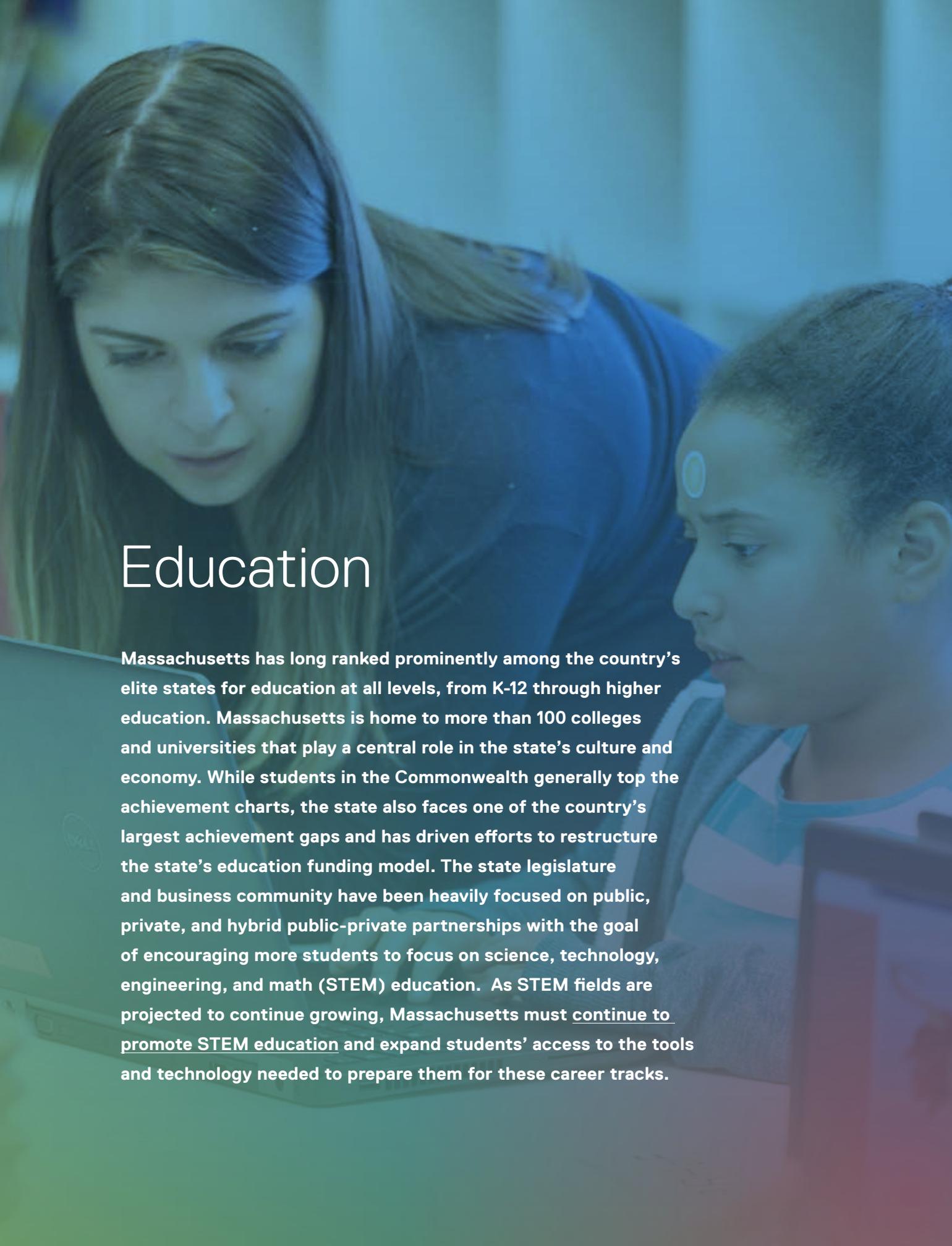
Cloud Computing: Healthcare providers rely deeply on cloud computing today. One key area for expansion is cloud-supported telemedicine technology. Telemedicine will continue to grow at a rapid pace, particularly in rural areas and for those with limited mobility. As state policy catches up with technology, telemedicine will improve access and cut costs. Continued innovation on electronic health records, and their secure access through cloud-based services, will streamline the ability to more efficiently allow multiple, distributed care providers to access patient data in real time.

5G: The advent of 5G is an exciting new horizon for healthcare. At the most basic level, it will help the healthcare provider deliver better care and outcomes for their patients. 5G along with other emerging technologies will blur the walls between the hospital and the home, better managing the care of long-term patients who require the most resources from the healthcare system. It will help power personalized, smarter care capabilities and elevate connected medicine to an unprecedented level. Better healthcare means more than just cutting costs and providing improved service.

Robotics: Massachusetts is a global leader in robotics technology. Massachusetts General Hospital, for example, currently uses robots like [“the da Vinci Surgical System”](#) to perform procedures. As technology advancement and adoption continue, robots will provide 24/7 support to understaffed hospitals and serve as “mini health clinics” to perform basic diagnostic tests and other general functions.

VR/AR: Massachusetts hospitals and medical education institutes will continue to expand the use of VR and AR to provide immersive training and simulations for front-line health workers and aspiring specialists. VR and AI also will redefine imaging instruments and techniques to help doctors identify and proactively respond to serious health conditions.

Blockchain: Given the critical needs to maintain stringent security in healthcare systems, protect the privacy and integrity of patient information, and maintain an audit trail for patients visiting multiple care providers, blockchain promises to be a foundational piece of healthcare data management.

A woman with long dark hair is leaning over a young girl with her hair pulled back. They are both looking intently at a laptop screen. The scene is dimly lit with a blue and purple color cast, suggesting a classroom or lab environment. The woman is on the left, and the girl is on the right, both facing the laptop.

Education

Massachusetts has long ranked prominently among the country's elite states for education at all levels, from K-12 through higher education. Massachusetts is home to more than 100 colleges and universities that play a central role in the state's culture and economy. While students in the Commonwealth generally top the achievement charts, the state also faces one of the country's largest achievement gaps and has driven efforts to restructure the state's education funding model. The state legislature and business community have been heavily focused on public, private, and hybrid public-private partnerships with the goal of encouraging more students to focus on science, technology, engineering, and math (STEM) education. As STEM fields are projected to continue growing, Massachusetts must continue to promote STEM education and expand students' access to the tools and technology needed to prepare them for these career tracks.

Role of Emerging Technologies

Emerging technologies have an outsized potential to reshape Massachusetts' education system, enabling teachers and students to access fully-immersive content, personalize lesson plans, enhance teacher training and increase monitoring and evaluation outcomes to prepare students for the 21st century economy. This is particularly relevant given the priority around expanding access to STEM education to sustain the state's growth as an international innovation hub.

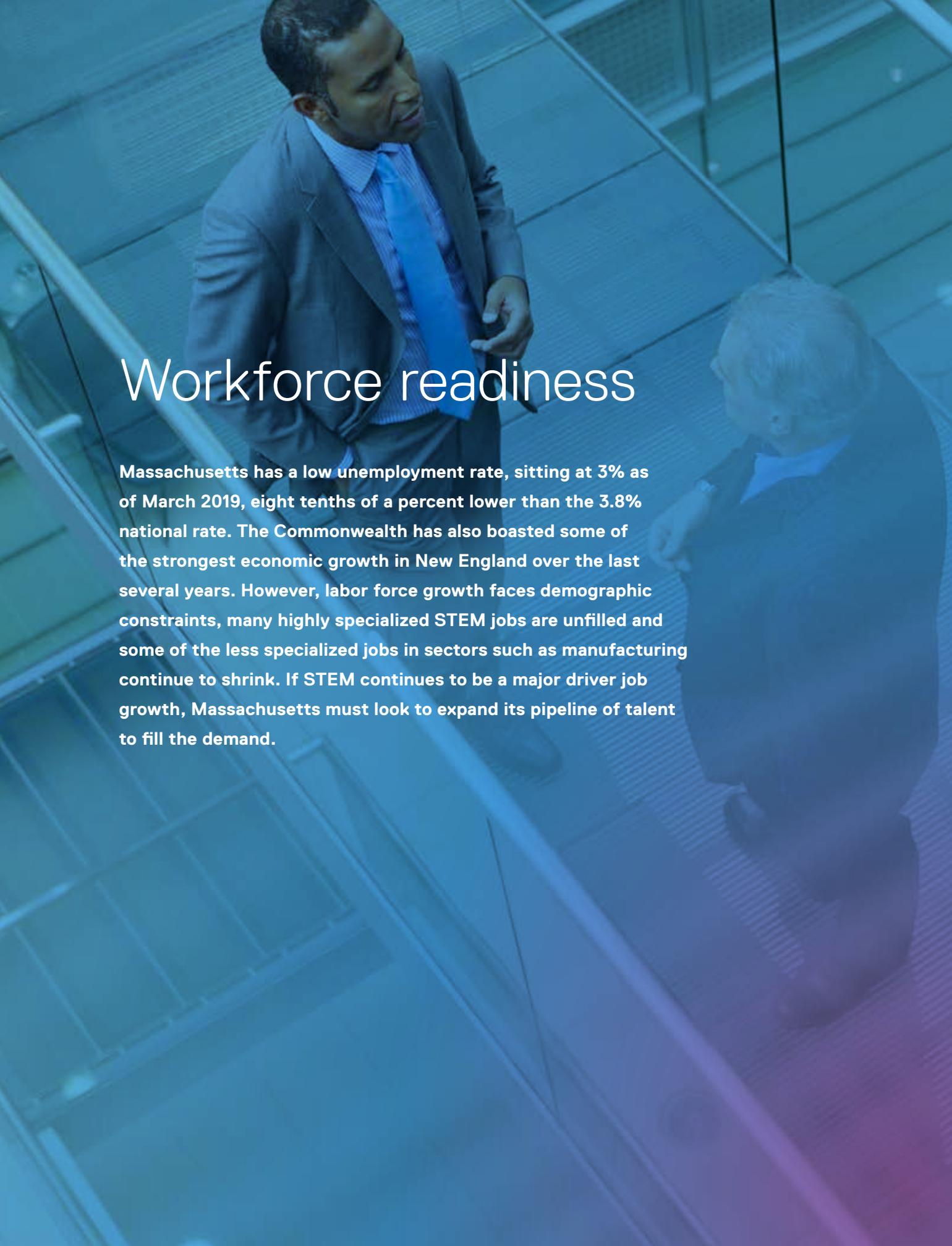
AI and Machine Learning: Diagnostics powered by AI will help teachers better analyze student progress and automatically generate new content and worksheets to provide students feedback and tailored assignments. Administrators also will be able to use AI to track attendance, monitor progress, and quickly identify gaps and adjust to anomalies. In addition, AI will be deployed to design custom professional development courses to help teachers create more interactive and engaging lesson plans.

Cloud Computing: The emergence of cloud computing is a key driver of leveling the playing field for students, providing digital access to materials and programs that were previously restricted by socioeconomic factors. As the state works to increase education funding, cloud-based resources will also help ensure that the most current and relevant content being taught.

IoT: RFID-enabled ID cards will enable administrators to smoothly monitor attendance and reduce absentee rates. The continued widespread deployment of mobile technology will also help increase school safety and support expanded access to a wide range of relevant information.

5G: To meet the needs of a rapidly changing world, we need an underlying network that can power the speed of connection with the breadth of data. 5G will provide that infrastructure and push smart devices at schools, creating a secure, smarter data streams and enabling greater personalization. 5G will unleash the full potential of IoT capabilities deployed at schools.

VR/AR: Teachers using VR/AR will be able to design fully immersive and interactive simulations – fostering curiosity and providing virtual substitutions for physical lab space or design workshops.



Workforce readiness

Massachusetts has a low unemployment rate, sitting at 3% as of March 2019, eight tenths of a percent lower than the 3.8% national rate. The Commonwealth has also boasted some of the strongest economic growth in New England over the last several years. However, labor force growth faces demographic constraints, many highly specialized STEM jobs are unfilled and some of the less specialized jobs in sectors such as manufacturing continue to shrink. If STEM continues to be a major driver job growth, Massachusetts must look to expand its pipeline of talent to fill the demand.

Role of Emerging Technologies

By 2030, workers will leverage new platforms and techniques to acquire the skills and knowledge needed to execute their tasks successfully, partnering with machines to learn critical skills on the job. Emerging technologies will create platforms for individual learning and help perform complex and unfamiliar tasks in real time.

Cloud Computing: New mobile apps powered by cloud computing will help employers deliver tailored skills training content and track and compile data to measure employee improvement.

IoT: Smart devices and wearables will provide real-time feedback to individuals and employers and help identify productivity-enhancing techniques.

5G: 5G empowers massive progress and will manifest itself in critical use cases with today's workforce. To take advantage of the new infrastructure capabilities, new tools and skills for operational excellence will need to be integrated alongside data science and computer science skill sets.

VR/AR: VR and AR capabilities will provide immersive training experiences and simulations across a range of industries, including in manufacturing and healthcare, as mentioned in an earlier section of this report.

AI and Machine Learning: Sentiment analysis for text and facial recognition software will help job-seekers practice and develop the soft skills required to succeed in the workforce and eliminate bias across the entire talent continuum from recruitment to hiring to advancement, enabling broader access to opportunities.

Sustainability

There is now an array of international, national, and local assessments of climate change's impact on all facets of our lives. Action is already well underway in Massachusetts to do its part in creating sustainable communities, but the state still faces strain on its energy resources and other infrastructure. This existential challenge only becomes more significant when considering population growth. The Greater Boston Area is rapidly expanding in particular, from what have already been record highs, with more businesses relocating and more people moving to the area than ever before. Analysis of the best demographic data available projects Boston alone to have a population of 760,000 by 2030, a projection adjusted upward by about 50,000 from one made less than five years ago by the same groups. While this growth is a positive sign for the Massachusetts economy, accommodating the growth with policy decisions that prioritize sustainability, across every facet of energy consumption, is now imperative.

One of the most critical policy areas for prioritizing sustainability is transportation. Modernizing the state's transportation infrastructure is an already immense challenge that compounds as the system becomes increasingly strained, particularly by the growth of cities. In order to meet this need, the state will work with local governments and the private sector to focus on modes that drive efficiency, create and improve infrastructure, and ultimately minimize vehicle traffic in order to reduce emissions.

Role of Emerging Technologies

The successful application of standards for sustainability will require careful measurement, and technology can both enable that measurement and drive subsequent real-time adjustment of energy use. The leveraging of technology toward sustainability benchmarks, particularly in transportation, will be central to broader economic success and general quality of life.

AI: State and local transportation departments will be able leverage AI and predictive analytics to monitor and adjust traffic patterns to maximize key parameters – including efficient transportation flow and road safety. The state will use AI to automate public transportation fleets and improve vehicle safety to reduce accidents and maintain traffic flow. AI will utilize real time algorithms to improve traffic lights systems and improve traffic patterns and flow. These and other traffic reduction efforts will continue to be a valuable part of reducing CO2 emissions.

Cloud Computing: Cloud-based systems for recording neighborhood-specific data points are critical for identifying ways to make city services more efficient. For example, trash and recycling collection will be made more efficient through the real-time input of data about the collection amounts and route completion times.

IoT: The state will continue to use IoT as we work to improve sustainability. IoT is already supporting ride share programs. State water officials will utilize sensors to monitor water quality in real time to swiftly identify and mediate sources of potential contamination or other health risks. IoT will help the state increase overall efficiencies and reduce waste of time and resources.

Robotics: Public utility officials will utilize robots to manage water, power and waste management infrastructure remotely, as well as perform regular maintenance in hazardous environments.

VR/AR: Along with smart meters, AR-enabled devices will allow Massachusetts residents to perform regular maintenance in hazardous environments.

Manufacturing

Manufacturing in Massachusetts has changed over the years, but it is still one of the largest markets in the country, in part because of a virtuous cycle of innovation economy growth and the steady development of candidates for the highly specialized jobs. The growth of companies making pharmaceuticals and hardware for technology companies is cause for continued optimism. The most significant hindrance to furthering modern manufacturing is the ability to continue developing a workforce that can fill these changing jobs as more and more physical manufacturing work is conducted by machines.

Role of Emerging Technologies

As an innovation hub, Massachusetts' manufacturing industry should be geared toward:

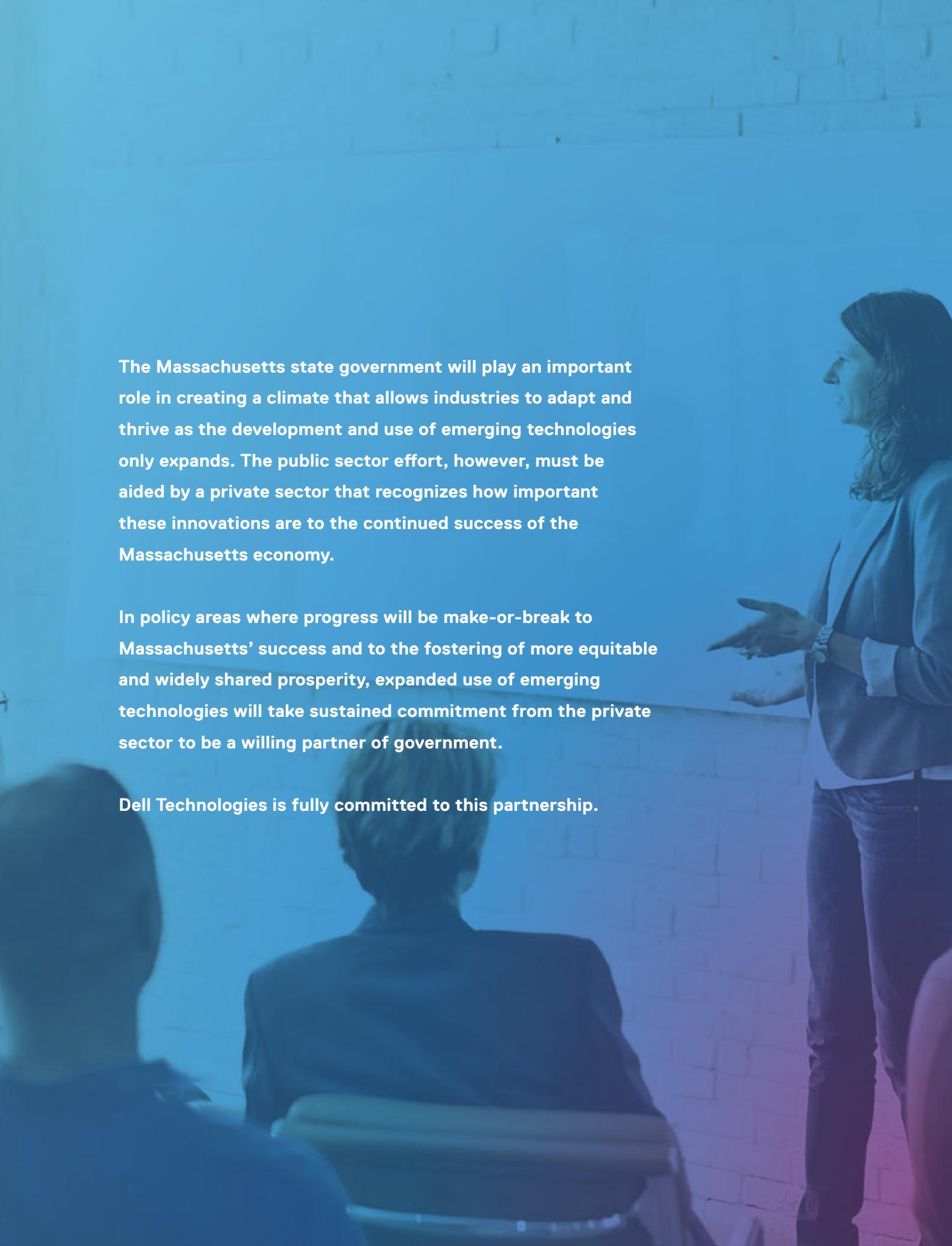
AI and Machine Learning: Companies will leverage machine learning technology to automate and optimize supply and product distribution and warehouse management, ensuring more and more efficient delivery of goods while avoiding overstocking and understocking.

Robotics: Robotics is changing the face of advanced manufacturing. The International Federation of Robotics estimated that by 2018 there would be more than 1.3 million industrial robots working in factories around the world. Massachusetts, under the current gubernatorial administration, has become a partner in the nation's first innovation institute in manufacturing robotics. Robotics technology will allow Massachusetts' advanced manufacturing facilities to compete globally as robot usage becomes more prevalent.

IoT: Massachusetts will use sensors on the floors of advanced manufacturing facilities to provide real-time data that helps companies optimize usage and detect wear-and-tear before it happens.

5G: Manufacturing plants are getting smarter. Machines will host hundreds of sensors and actuators giving visibility and control not only to local staff but to remote operators. 5G networks will have the ability to connect, collect and process device functionality close to the edge, therefore enabling and accelerating industrial automation.

Cloud Computing: Factories will leverage cloud-powered mobile apps that use workers' smartphones to ensure process compliance and monitor line efficiencies.

A woman with long dark hair, wearing a light-colored blazer and dark pants, stands in profile facing right, gesturing with her hands as if speaking. She is in a room with a white brick wall. In the foreground, the backs of several audience members' heads and shoulders are visible, suggesting a presentation or meeting. The entire image has a blue color overlay.

The Massachusetts state government will play an important role in creating a climate that allows industries to adapt and thrive as the development and use of emerging technologies only expands. The public sector effort, however, must be aided by a private sector that recognizes how important these innovations are to the continued success of the Massachusetts economy.

In policy areas where progress will be make-or-break to Massachusetts' success and to the fostering of more equitable and widely shared prosperity, expanded use of emerging technologies will take sustained commitment from the private sector to be a willing partner of government.

Dell Technologies is fully committed to this partnership.

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www.delltechnologies.com/en-us/perspectives/series/public-policy-2030