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Five Trends That Have Transformed the Economy Forever: Why this Matters for Massachusetts Companies

Executive Summary
June 15, 2012

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MassEcon 19th Annual Conference Executive Summary
Five Trends That Have Transformed the Economy Forever: Why this Matters for Massachusetts Companies
Newton Marriott Hotel, June 15, 2012

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Brandeis University International Business School

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iRobot

Dr. Prat Moghe, *Vice President, Big Data Appliance Strategy & Products*
IBM

Mohamad Ali, *CEO*
Aspect Workforce

Moderator: **Bob Boudreau,** *President and CEO*
The Winter, Wyman Companies

MassEcon's 19th Annual Conference began with moderator **Bob Boudreau**, President and CEO of The Winter, Wyman Companies, discussing the common threads between the panelist's topics. He explained that the only constant he found was change and highlighted the vital importance of adaptability. Mr. Boudreau noted that it is particularly important to embrace change during recessions as they present companies with opportunities to go from good to great.

Mr. Boudreau then discussed the issue of talent management, explaining the increasing demands employers must meet in order to retain talented workers. He explained the coming labor shortage based on the sheer size difference between generation X and the baby boomer generation. Mr. Boudreau cited that Winter, Wyman is seeing companies begin to adjust for this trend already, particularly through offering greater flexibility to employees. Mr. Boudreau emphasized that we must figure out a way to educate the new generation of workers because we cannot afford to have a gap in talent, but also noted that this is a wonderful opportunity for companies to adapt and grow. Mr. Boudreau then explained the format of the event and provided a detailed introduction for the first panelist, Dr. Catherine Mann.

Dr. Catherine Mann, Brandeis University International Business School
Dr. Catherine Mann discussed the globalization of information technology and the implications this has for businesses and labor. Dr. Mann began by explaining the history of cross-border trade in computer and information technology services. Exports were originally greater than imports, but the United States moved from a surplus to a deficit in 2004. She explained that this same trend can be seen in other information trade systems as well, such as technology hardware. Many

scholars have said this is problematic, however, Dr. Mann argued that not only was the globalization of information technology hardware good for the economy and job creation, but that the dynamic that is currently occurring with information technology services is also beneficial for the economy.

Dr. Mann then discussed the different types of trade. She explained that most exports, in the computer information sector, are between a US company and an unaffiliated buyer in a foreign market, however, most imports are between a US parents company and their affiliate in the foreign market. According to Dr. Mann, this difference implies that US firms have a much greater competitive advantage in foreign markets, where as foreign firms are much less able to crack the US market. She argued that in order to take advantage of this global situation, it is vital that US companies have a physical presence abroad.

Next, Dr. Mann discussed the implications of this information for job creation. She stated that small US firms (1-99 employees) that are IT intensive and in the services part of the economy have generated the most rapid job creation in the US economy throughout the 2000s and into the recession. She concluded that the key challenge for Massachusetts is to create an environment in which firms can be global and yet also remain small. http://massecon.com/pdfs/events/Mann.pdf

Jeff Beck, iRobot

Jeff Beck began by discussing how iRobot seeks to solve meaningful tasks with robotics. He listed several iRobot products as examples, such as the Roomba and robots that help with elder care. Mr. Beck then gave a brief overview of the company, noting that it is the only publicly traded robotics company and that iRobot has shipped 1.3 billion dollars in products so far. He explained the state of robotics in Massachusetts and stated that Massachusetts is really the place where robotics started and has nearly a billion dollars of annual revenue in the industry.

Mr. Beck then further explained some of iRobot's products in detail, discussing their uses and practical implications. First, he discussed the robots that iRobot builds for the US Army, such as the PackBot. He explained that previously soldiers had to look in dangerous caves manually and risked serious injury. PackBot allows soldiers to view the inside of a cave or building without entering. This technology has already saved many lives, as evidenced by the destroyed robots sent back to iRobot by living soldiers. Next, Mr. Beck explained how iRobot sent its Seaglider robot down to the Gulf of Mexico during the BP oil spill. The robots found plumes of oil thousands of meters below the surface, which other firms were then able to recover. Thirdly, Mr. Beck described how iRobot's defense robots were quickly adapted during the nuclear disaster in Japan so that they could be used to see inside the plant and help clean up the radioactive debris. Lastly, Mr. Beck described the multiple iRobot's that are available for home use. iRobot's robots can clean floors, bathrooms, pools and gutters. Mr. Beck stated that iRobot was working hard to create a fully autonomous home.

Mr. Beck concluded his presentation by describing how exponential growth has occurred over the past few years as the robotics technologies have converged with the practicability of what robots can do, leaving the industry in an excellent position.
http://massecon.com/pdfs/events/Beck.pdf

Prat Moghe, IBM
Dr. Prat Moghe began his presentation by boldly declaring that all the hype surrounding big data is very real, and that it will indeed have a transformative effect on the economy and a transformative effect on Massachusetts.

Dr. Moghe provided a brief overview of the history of big data. He explained that the concept originated at the company Neteeza long before the term 'big data' was even coined. He then explained what big data is. He noted that everyone is surrounded by devices, citing the 15 devices present on his own kitchen table as an example. He cited the fact that the number of cell phones in the world will soon exceed the number of people as an example of how much data is around us, adding that cell phones represent merely a small fraction of all data. However, he stressed that big data is not just about a lot of data, but rather insight. He noted that many people feel overwhelmed by data, and joked with the audience about never feeling satisfied with email at the end of the day. Big data is about collecting all this data and staying ahead of it, which will allow us to have more control.

Dr. Moghe then explained the relation between real time and big data in more detail. He stressed that if you store all the data and analyze it later, you can never keep up with it. He described how we must process data as it is coming and instantaneously decide what is garbage and what is important. Dr. Moghe explained that there are three V's in big data – volume, velocity, and variety. Velocity refers to this processing of data in real time. Next, Dr. Moghe discussed variety. He explained that big data is not just about phone conversations or tweets; there are all kinds of data and many of them are unstructured. He said that variety is about putting all this data together.

Next, Dr. Moghe discussed how big data will transform every industry. He noted that he believes it is a 20-30 year phenomenon, similar to the internet. He described how it took a long time for the internet to be accessible by everyone, explaining that the first 5-10 years of big data will be driven by technologists but in the next 20 years after that the focus will be on making big data interesting and relevant to everyone. Dr. Moghe stressed that every industry will be reformed and that big data is a phenomenal opportunity. He further noted that Massachusetts has a great opportunity to be a big data leader because of the skills currently present in the workforce.

Dr. Moghe finished with a few examples of how big data is currently being put to use. First, he cited that coupons are being advertised to consumers based on their online profiles. Next, he discussed how IBM is working with the University of Ontario and the Hospital for Sick Children to monitor neonatal babies in real time. They are working to use big data to detect serious illnesses before symptoms are available. Third, he noted that T-Mobile is using big data to analyze why users leave and prevent others from doing so. Lastly, he mentioned the wind turbine company Vestas' use of big data to determine the optimal location for wind turbines.

Dr. Moghe concluded by reiterating that big data is about volume, velocity and variety, but also about the transformation of industries and the democratization of data.
http://massecon.com/pdfs/events/Moghe.pdf

Mohamad Ali, Aspect Workforce
Mohamad Ali began his presentation by noting that, as many of the attendees provide services to companies operating in Massachusetts, they were likely to be interested that the analytics and optimization industries include many of the Massachusetts companies that are spending and growing. Mr. Ali then discussed the changing expectations in customer experience and how this evolution relates to big data, using the example of companies such as Amazon and United that have abandoned old business models that involved customers waiting in line and navigating call centers in favor of services like Amazon Prime, online troubleshooting features, and mobile alerts that streamline the delivery of goods and services and outperform less innovative competitors. Mr. Ali emphasized that conglomerates like United rely on software developed by small companies, many of which are based in Massachusetts, that use big data advances to process information more quickly and efficiently, improve customer experiences, and increase profits. To illustrate the role played by Massachusetts companies in optimization, Mr. Ali provided a case study of his own company, Chelmsford-based Aspect Software, which developed software to optimize the workflow of an online pharmacy, allowing the company to cut its shipment time and reduced customer healthcare costs. Consumers have quickly come to expect this improved customer service, thus creating continued demand for the horizontal crunching of big data across industries, as opposed to vertical development of algorithms in a specific field. However, Mr. Ali noted that perfecting niche algorithms is often a precursor to achieving successful optimization across diverse sectors. Mr. Ali then drew upon his past experiences at IBM to explain that big data processing must continue to take cues from the clean, well-defined methods of manufacturing and robotics.

Mr. Ali closed his presentation by explaining the reasons for analytics and optimization success in Massachusetts and the future of big data. Citing the Mass TLC Big Data Report which recognized more than 100 Massachusetts companies performing optimization and McKinsey reports that big data will add 300,000 U.S. jobs by 2020, he identified Massachusetts's research facilities as essential to ensuring that the Commonwealth remains a big data leader. Mr. Ali explained that 30 to 40 years ago, different universities focused on different technology categories. Stanford focused on silicon; some Massachusetts universities concentrated on computing power and clean systems; Berkeley focused on databases; and MIT focused on algorithms. According to Mr. Ali, the largest lab at MIT, the CSAIL lab, concentrated on "high-level" algorithms that are essential to data optimization. He argued that this is one of the key reasons behind the large analytics industry present in Massachusetts. Mr. Ali concluded by mentioning several Massachusetts-based companies that are expanding the field of big data optimization and urged conference attendees to seek out such growing companies, many of which are looking to spend to increase their presence, as desirable partners to which they should market their services.
http://massecon.com/pdfs/events/Ali.pdf

Question and Answer Period

Peter Brown, Director of Business Development at Campanelli Companies, asked, "Regarding the IBM advertising slogan of 'smarter': What's the next iteration of 'smarter'"?
Dr. Prat Moghe acknowledged that the iteration of "smarter" was developed by IBM's Jon Eduardo before stating that companies have traditionally thought about the technology they are developing but not about how technology can change society. He said that while big data is not yet at a place where whole cities or the planet are smarter, it is at the crucial point where big data is allowing us to collect and streamline clean data to connect various industries.
Dr. Catherine Mann added that, for her, "smart" in terms of globalization means using the data to ask the right questions. She stated that asking the right question is different across industries and countries and that big data allows us to ask questions that are tailored to the needs of each country's market. Dr. Mann believes that small companies, who often do not have a legacy problem, are likely to ask the right or "smart" questions.
Prat Moghe added that an attribute of big data is that it does not require thinking about the question in order to collect data. Because the world of big data makes no assumptions, big data can be used to collect information and then use that data (e.g. demographic information) to know which questions to ask and make decisions that take the individual into account. For IBM and Dr. Moghe, there is no longer such a thing as the "average consumer" and big data has allowed for more personalized analysis and decision-making.
Mohamad Ali referenced a recent article in *The Economist* that applied the concept of individualization to "personalized manufacturing", citing examples ranging from the introduction of personal preferences into processes that were formerly considered "one-size-fits-all" (e.g. the manufacturing of hammers) and the advent of the 3-D printer.
Jeff Beck said that, in robotics, "smarter" translated into increased machine autonomy. Specifically relating to iRobot, increased autonomy is being used in the development of the popular household robot, the Roomba, and equipping the Roomba with the capability to make the decision to change directions and target where dirt is immediately.

Mike Gennert, Professor and Director of Robotics Engineering at WPI, asked, "Do you see that there is a chance for big data and automation to merge? Can you see a chance that the two could combine to create job opportunities in Massachusetts that can't be reproduced elsewhere?"
Mohamad Ali highlighted the use of parallel processing in labs like CSAIL at MIT that allows for computer analysis across hundreds and thousands of dimensions to find the intersection of big data and automation.
Jeff Beck added that much of the automation in the manufacturing setting is static, with task-specific robots bolted to the floor. He visualized the future of automation as using big data analysis to allow the robots to be mobile and process decisions about, for example, which type of engine to install in an automobile.
Catherine Mann added that the intersection of big data and high technology amidst a mini-resurgence of manufacturing in the U.S. allows for a focus on high-value added, low-volume manufacturing that runs counter to economies of scale and long production lines that have defined global manufacturing for 20 years. According to Dr. Mann, the focus should be on small companies that make high profits, are able to pay high wages, do not have a legacy problem, and make use of the opportunity to intersect advances in automation and big data.

David Hayes, Senior Vice President of BSC Group, asked, "Regarding health care: if you were given free reign, what and how long would it take to address the issues of streamlining healthcare costs and is there a vehicle in the private sector to support the federal government?"
Mohamad Ali asked the audience who was still in possession of their X-rays from the past 5-15 years. When almost no one responded that they had these X-rays, he indicated that the healthcare industry has prevented people from obtaining and keeping their own data. He emphasized that there needs to be a way for people to access their own data.
Jeff Beck addressed the part of the question that mentioned the government by noting that iRobot has developed a technology that can provide elder care that allows the elderly to remain in their home longer without assisted living arrangements. However, the healthcare companies only reimburse doctors for when patients visit the doctor's office and not for telecommunication visits that would spare elderly from inconvenient doctor's visits.
Catherine Mann agreed that the US is nowhere near leading the world in healthcare in terms of dollars spent and outcomes and responded that it is important to talk about healthcare-insurance nexus and to remember that insurance companies are private and not part of the government, though they do possess tremendous lobbying power. She offered the analogy of the role played by ratings agencies in the financial crisis to illustrate the role played by insurance companies in the healthcare debate.
Prat Moghe stated that big data can be used to democratize data and bring visibility to data in a way that can transform how people view their own data, in a manner similar to what Mohamad Ali mentioned.

Peter Brown, Director of Business Development at Campanelli Companies, asked, "Can you picture having all your personalized big data on a mobile device such as an iPhone in a way that is private that is able to transferred across states and insurers?"
Prat Moghe affirmed that the technology of personalized data was advancing faster than business and government policies towards healthcare. He provided the example of all doctors using laptops to portably store data in their offices and said that this allows the patient to have more influence in patient-doctor interaction because of the greater accessibility of data in a variety of topics. According to Dr. Moghe, big data can be about both big outcomes and small outcomes; it is about small insights and depth and the empowerment of the individual to be able to get more information and use technology to challenge the status quo. He also raised the importance of considering who gets to use the data.
Mohamad Ali addressed the question about data accessibility on the iPhone, stating that he has all his X-rays stored on his iPhone because of Westborough-based [previous Economic Impact Award winner] eClinical Works, which built a hosted solution on a secure back-end server that allows doctors to upload patient data into computers and patients to sign up to have their medical data transferred among doctors who have this technology. According to Mr. Ali, big data and medical analytics are "no longer science-fiction."
Catherine Mann agreed that the technology had the ability to store personal medical data, but raised two significant questions: (1) will people actually use these technologies and (2) how will the issue of privacy be addressed. Dr. Mann explained that there is no incentive in the private marketplace for companies who compromise data and make it available for everyone to see, the companies are not willing to spend the money to guard the data because there are not sufficient disciplinary measures.

Mohamad Ali agreed with Dr. Mann's concern about security breaches, but provided the analogy of the stringent security protections provided by core banking institutions as a way to allay fears about healthcare data privacy.
Catherine Mann concluded that federal regulation through the Federal Trade Commission and the threat of class action lawsuits can be used to provide incentive for private companies to protect data.

Moderator **Bob Boudreau** concluded the question-and-answer session and thanked the panelists for an enlightening discussion on the intersecting trends of big data, automation, and globalization.

Susan Houston also thanked the entire panel, the sponsors, and all who attended the event as well as highlighting future MassEcon events including the annual Economic Impact Awards.

Speaker Profiles

Robert E. Boudreau, Jr., Chief Executive Officer, Winter, Wyman

Bob Boudreau, CEO, oversees all strategic planning and operations and leads the senior management teams for all The Winter, Wyman Companies. Mr. Boudreau has twenty years of experience in the staffing industry and has held the position of Winter, Wyman's CEO since 2002. Mr. Boudreau joined Winter, Wyman in 1992 as Controller and was promoted to CFO in 1995. Prior to joining the firm, Mr. Boudreau held senior financial positions with Millipore Corporation, Charles River Data Systems and Olympic Systems. Mr. Boudreau holds a Bachelor's degree in Business Management with a Concentration in Accounting from the University of Massachusetts, Lowell and serves on the Board of Junior Achievement of Northern New England.

Dr. Catherine Mann, Ph.D., Brandeis University International Business School

Dr. Mann, the Barbara and Richard M. Rosenberg Professor of Global Finance, joined Brandeis University in 2006 after more than 20 years working in policy institutions in Washington D.C., including the Institute for International Economics, the Federal Reserve Board of Governors, the President's Council of Economic Advisers, and the World Bank. Her current research focuses on two related topics: information technology and services trade in global markets, and the US trade deficit and the dollar. In addition to her policy work, Dr. Mann is author of two books and articles that have been published in scholarly journals such as the *Review of International Economics*. Dr. Mann is a fellow at the Peterson Institute for International Economics and, prior to joining Brandeis, was a faculty member at Vanderbilt University and Johns Hopkins University. Her work with the Ford Foundation has allowed her to travel the globe studying international economic policy and technology. Dr. Mann holds a Bachelor's degree from Harvard University and a Ph.D. in Economics from the Massachusetts Institute of Technology.

Jeff Beck, Chief Operating Officer, iRobot

As Chief Operating Officer of iRobot, Jeff Beck oversees all day-to-day operations. He brings more than 20 years of high-technology leadership to iRobot. The company was founded in 1990 by Massachusetts Institute of Technology scientists with the vision of making practical robots a reality and currently designs and builds robots that make a difference. Previously, Mr. Beck served as president and general manager of iRobot's Home Robots Division, where he was responsible for all aspects of the division's global strategy, product development and operations. Prior to joining iRobot in 2009, Beck served as senior vice president and general manager of the aerospace and defense division of AMETEK, Inc. He has also held senior management positions at Danaher Corporation and Emerson Electric Corporation. Earlier in his career, Beck was a mechanical design engineer at Sargent & Lundy Consulting Engineers. Mr. Beck holds a Bachelor's degree in mechanical engineering from the New Jersey Institute of Technology and a Master's degree in Business Administration from Boston University.

Dr. Prat Moghe, Ph.D., Vice President of Big Data Appliance Strategy & Products, IBM

As the Vice President of Big Data Appliance Strategy & Products for IBM, Dr. Prat Moghe is a leader in inventing next generation technologies. Dr. Moghe began his career as a systems management and networking researcher for the Bell Laboratories in New Jersey. After working as a Bell researcher, Dr. Moghe expanded into entrepreneurship as the founder and CEO of two venture-financed startups. His first venture, a video-streaming company called StreamCenter, was followed by Tizor Systems, a security and data compliance venture that made software to audit and guard data center information. Tizor was bought by the analytics leader Netezza in 2009 and Dr. Moghe became a senior vice president of the Netezza management team. This position allowed Dr. Moghe to be among the pioneers who used analytics appliances to crunch big data more quickly. When Netezza was acquired by IBM in 2011, he transitioned to this current position, where he is responsible for strategy, products & marketing of Netezza appliances within IBM's multi-billion dollar information management division. In addition to his work with IBM's Big Data Initiative, Dr. Moghe is a Charter Member of the Boston chapter of The Indus Entrepreneurs (TiE), an organization that fosters the growth of early stage businesses, and was chosen to be president of TiE Boston in early 2012. A native of Mumbai, India, Dr. Moghe attended the College of Engineering, Pune and received a PhD in Electrical Engineering at the University of California-Los Angeles.

Mohamad Ali, Chief Executive Officer of Workforce Optimization, Aspect Software

Mohamad Ali is the CEO of Aspect Workforce, which provides software to optimize people-intensive processes, inside and outside the contact center, to significantly improve end-customer experience at lower cost. Previously, Mr. Ali was SVP and President at Avaya Global Services and, prior to that, SVP of Corporate Development & Strategy. Before joining Avaya, Mr. Ali was Vice President of Business Development & Strategy for IBM's Information Management Division where he acquired and integrated key acquisitions, including Cognos Incorporated ($5 billion), FileNet Corporation ($1.6 billion) and Ascential Software ($1.1 billion). Additionally, as IBM's senior state executive, he was responsible for the welfare of IBM's 5,000 Massachusetts employees. Mr. Ali also served as Vice President of IBM's EDA software business unit, Vice President of IBM's Information Applications software business unit, Director of IBM's E&TS systems services business unit, and Program Director of IBM's GSM semiconductor business unit. Prior to joining IBM, Mr. Ali held engineering and leadership positions in companies including Adobe Systems and Neural Applications Corporation, an artificial-intelligence start-up. Mr. Ali holds Bachelor's and Master's

degrees in Electrical Engineering from Stanford University. He serves on the board of Ember Corporation, on the Leadership Council of Oxfam America, and as chairman of the Massachusetts Technology Leadership Council. He was named to the *Boston Business Journal*'s 2008 "40 Under 40" list, and recognized by Massachusetts High Tech magazine as a 2011 All-Star.

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About MassEcon

MassEcon is a private, non-profit partnership of business, industry leaders, and government dedicated to fostering economic growth in the Commonwealth. Launched in 1993 as an outgrowth of recommendations of the Governor's Council on Economic Growth and Technology, MassEcon markets Massachusetts by providing information services to companies seeking to expand within or relocate to Massachusetts. MassEcon's services include the statewide Site Finder Service, helping companies find the right location within the Commonwealth; the Research &Information Service, providing customized information to support a company's site selection decision; and the Massachusetts Ambassadors program, a private sector leadership corps that helps market Massachusetts as a place to do business. Through these channels, and in conjunction with state and local partners, MassEcon has worked with over 1,000 companies including Sun Microsystems, Erie Plastics, Merck, and American Superconductor. Membership in MassEcon is open to all segments of the business community.

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