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9B17D011

interaxon inc.’s muse: aligning the supply chain

R. Chandrasekhar wrote this case under the supervision of Professor David Barrett solely to provide material for class discussion. The authors do not intend to illustrate either effective or ineffective handling of a managerial situation. The authors may have disguised certain names and other identifying information to protect confidentiality.

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On a Friday evening in late April 2016, Craig McMullen, vice-president of operations & global supply chain at InteraXon, had just come out of a meeting with Derek Luke, the company’s chief executive officer. For the past week, the two had been working on the details of a new strategic roadmap for the young company. Luke had suggested that McMullen put together a revised supply chain framework that was consistent with the company’s new growth plan.

InteraXon was a Toronto-based technology start-up operating in the bourgeoning market for wearables within the health and wellness space. Its flagship product was a lightweight headband called Muse, aimed at measuring the wearer’s brain activity. The headband was used in conjunction with a mobile application (app), also developed by InteraXon, focused on helping the wearer develop a meditation practice, and thereby enhancing, over time, the wearer’s state of mindfulness.

Said McMullen:

It is important to align the supply chain with the growth opportunity we have identified for InteraXon. We have fine-tuned the opportunity to get the right focus in terms of new geographical markets, new demographic segments, and new delivery channels. For example, the U.S. will be our primary destination market. It is not only the largest healthcare/consumer market in the world but a gateway to global markets. We want to focus on omni-channel distribution. It provides seamless transaction between online and offline stores for our customers. We are also considering repositioning Muse as a medical device. All these require InteraXon to consider a new supply chain framework.

the WEARABLE TECHNOLOGY INDUSTRY

Wearable technology products, or wearables, referred to personal accessories incorporating advanced computing and electronics and attached to body parts such as the head, collar, chest, arm, wrist, waist, ankle, and foot. These products could resemble a watch, eyeglasses, clothing, contact lenses, or shoes. They captured, monitored, and analyzed data from the wearer’s daily life. The data were unique to the individual wearer. The range of data could vary from, at its simplest, the number of steps taken in a day to, at its most complex, the movements of brainwaves. The manner of output could also vary, from the blinking of a light-emitting diode (LED) light to a display on a screen.

Wearables were the outcome of progressive developments in technology since the 1970s, such as the switch from analog to digital, the miniaturization of components, enhancements in computing power and storage capacity, improvements in battery technology and capacity, and the incorporation of wireless connectivity. It was during the early 2010s that wearables caught on. Consumers were drawn to their convenience factor of logging any desired metrics—effortlessly, automatically, and continuously.

The wearables market had revenues of US$9.2 billion[[1]](#footnote-1) in 2014 and consisted of several segments, including fitness and sport, gaming and recreation, fashion and apparel, home and auto, defence and security, enterprise and industry, and healthcare.

CCS Insight, a British firm tracking global mobile devices and services, had estimated that the worldwide wearables market would record revenues of $34 billion in 2020 on sales of 411 million devices.[[2]](#footnote-2) The growth would coincide with the fall in sales of smartphones, which was forecast for the same period. The smartphone market had reached 90 per cent penetration in North America, Western Europe, Japan, and parts of Asia, slowing future growth.[[3]](#footnote-3) According to estimates by Gartner Inc., the annual growth rate of smartphones, worldwide, was forecast to decline to 7 per cent in 2016, from 14.4 per cent in 2015.[[4]](#footnote-4) Wearables would occupy the space vacated by smartphones.

Wearables for Health

Wearables for health represented the largest segment among non-consumer applications, and was valued at $1.1 billion in 2014.[[5]](#footnote-5) North America was the biggest market, at 52 per cent of revenues, followed by Europe (at 26 per cent) and Asia-Pacific (at 16 per cent).[[6]](#footnote-6) Wearables could collect and mine data on such parameters as heart rate, brain activity, sleep patterns, glucose level, blood pressure, and stress level. A provision was also available for sharing the data, in real-time, with caregivers. As a result, physicians could review an individual’s state of health and deliver care from remote locations. This use of wearables helped lower healthcare costs.

Wearables in healthcare were subject to tighter regulation than general electronic products, particularly in the United States; however, applications (apps) that were designed for use solely by individuals were exempt from regulation. At the federal level, the U.S. Health Insurance Portability and Accountability Act (HIPAA) had a “privacy rule” governing the use and disclosure of what was known as protected health information (PHI). It also had a “security rule” governing the electronic storage and transfer of PHI among healthcare providers and insurance firms. Digital health companies were also required to comply with the provisions of the U.S. Federal Trade Commission, which dealt with deceptive or unfair business practices.

Doctors and insurers were still coming to terms with healthcare apps. They were trying to understand which ones were useful for patients and which were not necessarily so.

Said Luke:

The sector is booming with technology start-ups. Those in the early stage, however, are facing four broad challenges. First, it is difficult to find the right hardware manufacturer who can source the components and deliver per specifications. Building a physical product is an expensive endeavour. Second, it is not easy to get the design and style of the product right and tie it up with product performance. Aesthetics are very important but you can never be certain about what clicks with the end-user. Third, you must get the value proposition right, upfront. The product should address a very specific customer need. Finally, there is the matter of consumer trust. Trust is an important issue in healthcare in general but more so with a wearable because of additional concerns around data privacy and data security.

INTERAXON—COMPANY BACKGROUND

The company was founded by a trio—Ariel Garten, a Canadian artist whose fascination was in exploring the intersection of art and neuroscience; Chris Aimone, a University of Toronto graduate with a master’s degree in computer engineering; and Trevor Coleman, who had expertise in promotions and marketing. The idea for commercializing electroencephalography (EEG) technology grew from Garten’s work in 2002 and 2003 with Steve Mann, then a computing engineer at the University of Toronto. In 2007, the founders teamed up to start InteraXon as “a thought-controlled computing company. . . . to help people become more in tune with themselves.”[[7]](#footnote-7) In the early days, the company survived on revenue from the development of experiential marketing activations. In 2012, funding was achieved through seed investment, followed by financing via a crowd-funding campaign. Subsequently, the company raised approximately $20 million through private equity.

Muse

Muse was InteraXon’s headband that measured brain activity through EEG in a similar way that electrocardiography (ECG) monitored heart rate. Muse contained seven EEG sensors: five were placed on the forehead and two behind the ears. It was also connected by Bluetooth to a smartphone. The app was available for download on Apple and Android mobile devices. Muse was designed to pick up EEG signals. The algorithm associated with the headband and the app considered five types of brainwaves: alpha waves (associated with a state of calm and relaxation), beta waves (associated with active thinking or problem solving), delta waves (associated with sleep), gamma waves (associated with higher mental activity and consolidation of information), and theta waves (associated with very deep relaxation and visualization).

When the headband was worn, a colour-coded screen appeared on the mobile device screen. As each sensor made a connection, a cone shape was filled with a corresponding colour. A voice would then ask the wearer to think of specific things (such as a fruit or a famous city) so that the headband could pick up the signals and configure the settings properly. This calibration process usually lasted a minute.

Once calibrated, the meditation session would begin. The headband picked up the brainwaves, converted them from analog to digital signals, interpreted them (through algorithms), and transmitted them to the mobile device for a corresponding display, enabling wearers to view their performance. Muse provided instant feedback on how the wearer was doing, with gentle wind sounds indicating a calm and focused mind and stormy wind sounds indicating an agitated and active mind.

If the wearer maintained a state of calm and focus for more than a few seconds, the app emitted the ultimate sonic reward: chirping birds. When the session time was up, the app displayed a dashboard showing the number of seconds for which the mind remained calm, neutral, and active. In an effort to gamify the experience, the wearer was also rewarded with points and the ability to unlock new features of the app in future.

InteraXon unveiled the basis for Muse with the capture and use of EEG on third-party hardware during the 2010 Winter Olympic Games in Vancouver. It piloted a project that allowed users on the West Coast to light up the CN Tower in Toronto, the Parliament buildings in Ottawa, or Niagara Falls in Ontario, thousands of kilometres away, by using just their minds.

Over the next four years, InteraXon refined the idea of a headband with the intent to promote it commercially as a tool to enhance concentration and lower stress through developing a regular meditative practice. In May 2014, InteraXon, now with 45 employees, formally launched the Muse headband. Developed in Toronto and manufactured in China, it was distributed initially only online at $300 per unit. Within weeks, the company had sold 5,000 units. In August 2014, it signed up Indigo as its first distribution partner to sell the headband in its bookstore chain. It also enlisted Best Buy Canada, which already had a wearables portfolio. By March 2015, the headset had generated revenues of $3.5 million. The $300 device racked up $3.5 million in sales in the last six months of fiscal year 2015/16. Muse was sold in more than 60 countries.

Muse had also led to the development of an ecosystem around it. Software development kits were available on Android, iOS, Mac, and Windows, and on platforms for the developer community to build on. Technical support was also available for those seeking access to the clinical-grade EEG signals.

Said McMullen:

Muse can tell you whether the mind is calm or turbulent. It is binary and does not go beyond two possible states. It, of course, guides the mind toward a state of calm. But it does not read the wearer’s thoughts. This is very important from the point of view of privacy. Muse is like a heart-rate monitor, which can tell that your activity level is elevated and not whether you’re running or biking. Right now, the only claim we make is that Muse helps you learn how to meditate. It is for customers to decide where meditation helps them; it’s not for us. But, as we keep getting third-party validation about its use beyond meditation, in oncology for example, we see the potential for use in diagnostics and therapeutics. Ensuring data privacy will be a major challenge for us when that happens.

THE MARKETPLACE

In April 2015, InteraXon conducted an online survey among 1,000 American adults who met the two qualifying criteria of an interest in practicing meditation and ownership of a smartphone. The survey enabled InteraXon to identify four types of “meditation persona” (see Exhibit 1). The identification was the result of an analysis of respondent statements related to three factors: level of personal pain, benefits expected from meditation, and difficulties with meditation. Although women and men were both promising targets for Muse, the survey found that women were more likely than men to believe that practicing meditation could improve wellness. Respondents between 26 and 40 years of age were most likely to meditate regularly. The survey also estimated that Muse had 44 million potential customers in the United States.

Said Luke:

We also took a look at our existing customers online. There was a prefab customer base we had not even realized existed. Among the buyers of Muse were psychotherapists, oncologists, fitness trainers. . . . They were not part of our original plan. So we asked them: “Why are you buying it?” They said: “It has a fit with what we do. It makes our tasks of treating someone with an eating disorder, with chronic pain, with a need to focus . . . so much easier.” We had students buying Muse to improve their grades and executives buying it to improve their productivity. In a world of digital distractions, it seemed to be a right product at the right time. We also found that self-direction was, as the customers perceived it, an inbuilt advantage of Muse.

In its first full year of operations in 2015, InteraXon had orders of 22 per cent from online and 69 per cent from retail channels. It also received 9 per cent of orders directly from professionals such as doctors. Fifty-five per cent of its sales were from customers in the United States, 32 per cent were from Canada, and 13 per cent were from the rest of the world.

The company was refining its operations model in early 2016. Its average gross margin, which was 56 per cent overall, varied with the channel: 67 per cent for online sales, 41 per cent for retail store sales, and 60 per cent for sales to professionals. Hardware sales represented the company’s main source of income. In addition to the flagship product, the company was also selling accessories. It bought the accessories from the open market and sold them at high margins. For example, it bought hard cases at $5 apiece and sold them at $40 each.

Said Luke:

If you’re a company doing hardware and just selling in retail, quite often that’s a race to the bottom price. You have to conform to the lowest cost and that is not a good space to be in. An example is the disk drive. It was a premium product 20 years ago but is commoditized today, running at very small margins. Hardware is a hard place to protect good markets. Apple is a good example of where we want to be heading. Apple was essentially a hardware company, making computers and phones. But that’s not what protected its high margins. What protected the high margins was the brand. People associate quality products with Apple. They buy them for features like ease of use and ease of integration.

In a bid to refine its offering, InteraXon was beta-testing a tool that it had developed to go with Muse. The tool, which was based on software as a service (SaaS), would supplement the core value proposition of Muse of teaching people to meditate by providing a dashboard that would provide a visual check of their conformity to meditation. The dashboard had originally been designed for use by professionals in fitness and healthcare. The goal was to license out SaaS for a combination of a subscription fee and a royalty on sales. Over time, revenues from SaaS were forecast to be higher than hardware sales (see Exhibit 2). A combination of licensing and hardware would improve the enterprise value of InteraXon from 10× to potentially 100× revenue, while as a hardware company, the valuation would be 1.5 to 5× revenue.

Target Customer Segments

InteraXon was keen on targeting Muse as a consumer product in the long run even though it was also pursuing institutional customers, such as medical clinics and hospitals. As early adopters, hospitals were creating product awareness and also providing a user database with which product refinements could be made. The April 2015 survey had pointed to four different segments in the consumer market. Given the company’s own propensity to look at Millennials (i.e., those in the age group of 18–34 years) as current and future customers for Muse, McMullen wondered how best to target each segment.

Distribution Channels

Choosing the appropriate distribution channels was a related issue that would have a bearing on determining the supply chain framework. Muse’s average gross margin was the highest with the online channel, at 67 per cent of the sale price, and the lowest with the retail channel, at 41 per cent. It was important for InteraXon to track the end-users, which to date was possible only with its online sales. The way forward seemed to be omni-channel retailing, wherein InteraXon would complement its online sales with a few of its own brick-and-mortar stores, which would serve as concept stores.

OPERATIONS AND SUPPLY CHAIN MANAGEMENT

Muse was being manufactured in China at a landed cost of $46.76 per unit (see Exhibit 3). The cost of offshore manufacturing was lower to start with but the ability to further reduce the cost of the product was diminishing. There was, in fact, upward pressure on the cost—potentially to a level that was comparable to a North American cost. China was also becoming less attractive because of two other reasons. First, compared with North American factories, factories in China were less compliant with the norms of the United States Food and Drug Administration (FDA). Second, China was not a consumption market for Muse, which was noteworthy because recently, companies that were offshoring their production to China were doing so to cater to local demand.

In recent years, several instances of reshoring had backfired. Reshoring occurred when a firm backtracked on its past offshoring decision and relocated offshore production to its home country or to a location nearby. Perhaps the most high-profile example of reshoring involved the smartphone maker Motorola Mobility, the mobile devices division of Motorola Inc., whose manufacturing operations were located in China. In August 2011, Google acquired Motorola Mobility, whose commitment to the Android platform had created a natural fit for Google, which, as a result of the acquisition, also gained access to Motorola’s mobile computing patents. In December 2012, Google sold the manufacturing assets of Motorola Mobility to Flextronics, an assembler of electronic components, which then became a contract manufacturer for Google. In December 2013, Google and Flextronics decided to reshore the smartphone manufacturing to the United States for two main reasons: the long distance to the manufacturing operations in China had made it difficult to make fast changes to the product, and Motorola Mobility was losing the ability to innovate. Manufacturing was thus relocated to Texas, where the product was to be designed, engineered, and assembled. In less than six months, however, the Texas factory had been shut down because of “high costs and weak sales.”[[8]](#footnote-8)

InteraXon was clear that it would not set up its own production facility and that, even in the event of reshoring, Muse would be made by a contract manufacturer. With that position in mind, McMullen needed to reconfigure the supply chain. A major requirement was managing the time to market. The finished product from China could take eight to 10 weeks to cross the ocean in a container and reach the port of landing. A location less than a day’s transport away would make the product more competitive by ensuring oversight on a daily basis, enabling closer monitoring of product performance, and addressing quality issues, such as reworking, on the fly (i.e., while production was underway).

Mexico was an option because of not only its perceived FDA-friendly production environment but also its cost structure, which was thought to be nearly identical to the cost structure in China. A Mexican manufacturing facility would be close to both the InteraXon offices in Canada and the destination markets in the United States. The time zone was similar, rendering 24/7 communication possible.

Canada was a difficult proposition. Over the past decade, the country had witnessed a gradual dismantling of its manufacturing infrastructure, particularly in the commodity electronics sector. Companies requiring parts to form into assemblies—such as plastic parts, mechanical parts, and electrical-mechanical parts—were having those parts manufactured at low-cost locations outside Canada. Flextronics, for example, had opened a solar panels manufacturing site in Newmarket, Ontario, and within three years, had moved it to Mexico. Finding skilled and semi-skilled workers had been difficult in Canada. A major issue, however, was the volatility of the Canadian dollar. A movement toward parity with the U.S. dollar, however small, would negatively impact the domestic cost structure.

A factor in favour of Canada as a manufacturing base was that InteraXon’s intellectual property (IP) was Canadian. The company’s value-added offerings—in terms of writing the code, developing the algorithms, building the database, and performing the diagnostics—were Canadian. Canada’s ecosystem in neurology ranked among the best globally. InteraXon thus had an opportunity to be at the cutting edge of Canadian competence in neuroscience and to showcase it to the rest of the world.

In choosing a location for reshoring between Mexico and Canada, several assumptions were involved. Because InteraXon would pursue contract manufacturing rather than its own manufacturing, the first assumption was that it would be looking for companies like Flextronics (in Mexico) and Celestica (in Canada) that were global and enjoyed economies of scale. Outsourcing manufacturing in the event of reshoring would remove several variables from the equation for InteraXon. For example, the cost of components, amounting to 68 per cent of the Chinese landed cost, would be out of InteraXon’s control because it would be negotiated by the designated contract manufacturer with each of its suppliers. The assumption here would be that the cost of components would increase by 10 per cent in Mexico and Canada. Second, labour costs between China and Mexico were comparable because the low cost of labour was a competitive advantage with both countries. While the labour costs in Mexico would therefore be the same as in China, the assumption for Canada was that they would be 300 per cent higher (including benefits). Third, overheads in China were 160 per cent of labour costs (or, more specifically, 10 per cent of the cost of components). They would be much less in both Mexico and Canada because global contract manufacturers were known to run tight operations, cutting overheads drastically in the pursuit of operational efficiencies. The assumption was that overheads would be five per cent of the cost of components for Mexico and Canada.

The contractor’s margin would be the only leverage that InteraXon could pull in the event of reshoring. In China, the contractor’s margin was ruled to be 7 per cent of the total cost and 29 per cent of the manufacturing cost. The assumption was that InteraXon would cut the contractor’s margin in absolute terms by 50 per cent in the event of reshoring. The sixth assumption was that the free carrier in both Mexico and Canada would be near zero because of the proximity to loading docks. Finally, there would be no customs duty and port handling charges for the product made in Canada, while for Mexico, they would be on par with China.[[9]](#footnote-9)

The United States was a compelling choice for reshoring. It offered several advantages in manufacturing. Its workforce was among the most productive globally—30 per cent more productive than Germany’s workforce and nearly twice as productive as South Korea’s. The United States was the global leader in patents, having mobilized more than 30 per cent of global investment in research and development and generating nearly 30 per cent of global patents. It also had low energy costs—with natural gas costing 30 per cent less in the United States than in Asia.[[10]](#footnote-10) The United States also held a competitive advantage in several industries that the health and wellness sector depended on—microelectronics, instrumentation, biotechnology, telecommunications, and software development.

Manufacturing Muse in the United States would provide InteraXon with an ability to deliver the end product rapidly, maintain low inventories, and ensure consistency in product quality in a market that it considered to be the target market for Muse.

The United States was a compelling choice for reshoring even from a marketing perspective. It was particularly attractive in the event of repositioning Muse as a medical device. The United States accounted for 38 per cent of the medical devices market worldwide with its revenues of approximately $133 billion in 2016.[[11]](#footnote-11) It was also the largest exporter of medical devices, serving as a gateway to other markets for aspirants such as InteraXon. The United States had more than 6,500 medical device companies, of which 80 per cent were start-ups with fewer than 50 employees, and most were located in such high-technology clusters as California, Florida, New York, Pennsylvania, Michigan, Massachusetts, Illinois, Minnesota, and Georgia.

Said McMullen:

Since trust is a major factor in marketing Muse, a validation from the FDA would provide InteraXon with credibility at three important levels—suppliers, consumers, and institutional customers. It would particularly help in gaining the buy-in of insurance companies for reimbursements. At the same time, Muse is a health and wellness app—an IT [information technology] product—that is not designated as a medical device. FDA’s validation could be pursued either on InteraXon’s own initiative or the FDA could itself bring Muse under its ambit as part of a blanket rule applicable to healthcare apps in general.

Exhibit 1: MUSE’s CUSTOMER SEGMENTATION

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Persona** | **Alana** | **Dana** | **Paul** | **Bill** |
| **Key Demographics** | Younger; married; kids living at home; highest household income | Older (but not the oldest);  least likely to be married | Average age; well educated; second-highest HH income | Older male (49% over age 60); no kids at home; lowest HH income |
| **Social Media Attitudes** | Most likely to have lots of apps; loves sharing on social media | Second-most interested in social media; has lots of apps; loves sharing | Likes sharing on social media but doesn’t have too many apps | Lowest level of involvement with social media |
| **Technology Attitudes** | Most enthusiastic about and comfortable with technology; most likely to have one or several wearable devices; most likely to use health apps; most intrigued about tech for meditation | Second-most enthusiastic about and comfortable with technology; not likely to own a wearable device but interested in it; moderately likely to use health/fitness apps; intrigued to learn about tech for meditation | Very comfortable with technology, but not a tech enthusiast; second-most likely to have a wearable device and to use health/fitness apps; moderate interest in learning about tech for meditation | Not a tech enthusiast but comfortable with technology; least likely to own wearable device or use health apps; low interest in learning about tech for meditation |
| **Level of Pain with Meditation** | Stressed; mind is too busy; anxious | Feels calm; good at balancing demands in life | Stressed; mind is too busy; anxious | Feels calm; good at balancing demands in life |
| **Benefits Expected from Meditation** | Feeling calm and relaxed; dealing with stress and anxiety; managing emotions; focusing | Feeling calm and relaxed; dealing with stress and anxiety; managing emotions; focusing | Feeling calm and relaxed; dealing with stress and anxiety | Focusing better; sleeping better |
| **Difficulties with Meditation** | Staying motivated; unsure of the process; no sense of belonging to community; frustrated that there is no way to monitor meditation progress; fears that others think meditation is weird | Experiences the least difficulties with meditation;  most likely of all segments to seek a spiritual benefit in meditation and to gain insight and understanding through meditation | Very little experience with meditation | Does not like attending groups or classes |
| **Involvement with Meditation** | Second-most likely to meditate regularly | Most likely to meditate either regularly or every once in a while | Most likely to say that he has not tried meditation yet | Meditates only once in a while |
| **% of the Meditation Market** | 27 | 28 | 30 | 15 |
| **Target for Muse** | Most promising target | Second-most promising | – | Not a target |

Note: HH = household

Source: Company files.

Exhibit 2: INTERAXON REVENUE STREAMS (expressed as %), CURRENT AND FORECAST, 2016–2020

|  |  |  |  |
| --- | --- | --- | --- |
| **Product Category** | **2016** | **2018** | **2020** |
| Accessories  SaaS/Licensing  Muse | 5  0  95 | 5  10  85 | 5  50  45 |

Note: All figures are as percentage of sales; SaaS = software as a service

Source: Company files.

Exhibit 3: MUSE’s COST OF CONTRACT MANUFACTURING IN CHINA, 2016

|  |  |  |  |
| --- | --- | --- | --- |
| **#** | **Elements of Cost** |  | |
|  | (US$) | Cost | % |
|  | Components  Mechanical  Electrical  Packaging | 9.45  15.79  6.71 | 20  34  14 |
| A | Sub-total Cost of Components | 31.95 | 68 |
|  | Manufacturing  Labour (Assembly and Testing)  Overhead  Contractor’s Margin  FCA | 2.95  4.75  3.20  0.27 | 6  10  7  1 |
| B | Sub-total Cost of Manufacturing | 11.17 | 24 |
| C | Total Invoice Cost FCA China (A + B) | 43.12 | 92 |
| D | Inbound Freight, Customs Duty and Handling | 3.64 | 8 |
| E | Landed Cost in North America (C + D) | 46.76 | 100 |

Note: FCA = free carrier, referring to the destination, typically an airport or sea terminal, where the seller is to deliver the manufactured goods

Source: Company files.

1. All currency amounts are shown in U.S. dollars unless otherwise noted. [↑](#footnote-ref-1)
2. “Wearables Momentum Continues,” CCS Insight, February 17, 2016, accessed November 21, 2016, www.ccsinsight.com/press/company-news/2516-wearables-momentum-continues. [↑](#footnote-ref-2)
3. “Gartner Says Worldwide Smartphone Sales to Slow in 2016,” Gartner, Inc., June 7, 2016, accessed August 12, 2016, www.gartner.com/newsroom/id/3339019. [↑](#footnote-ref-3)
4. Ibid. [↑](#footnote-ref-4)
5. MaRS Market Insights, *Wearable Tech: Leveraging Canadian Innovation to Improve Health* (March 2014), accessed March 28, 2017, www.marsdd.com/wp-content/uploads/2015/02/MaRSReport-WearableTech.pdf. [↑](#footnote-ref-5)
6. Ibid. [↑](#footnote-ref-6)
7. “Know Thyself with a Brain Scanner,” TED video, 15:04, September 2011, accessed June 20, 2016, www.ted.com/talks/ariel\_garten\_know\_thyself\_with\_a\_brain\_scanner?language=en#t-57478, at 0:59 to 1:05. [↑](#footnote-ref-7)
8. Rolfe Winkler, “Google’s Motorola Mobility to Close Factory in Texas,” *Wall Street Journal*, May 30, 2014, accessed December 15, 2016, www.wsj.com/articles/googles-motorola-mobility-to-close-factory-in-texas-1401462571. [↑](#footnote-ref-8)
9. The assumptions are made by the case authors. They are not company estimates. [↑](#footnote-ref-9)
10. Executive Office of the President and the Department of Commerce, “Winning Business Investment in the United States,” May 2014, accessed October 2016, www.esa.doc.gov/sites/default/files/winningbusinessinvestmentintheunitedstates.pdf. [↑](#footnote-ref-10)
11. “Medical Technology Spotlight: The Medical Technology Industry in the United States,” International Trade Administration, U.S. Department of Commerce, accessed October 15, 2016, www.selectusa.gov/medical-device-industry-united-states. [↑](#footnote-ref-11)