



Netherlands Enterprise Agency

A thematic analysis of emerging technologies in medtech in greater Boston

Key Takeaways & Recommendations for Dutch Entrepreneurs





A THEMATIC ANALYSIS OF EMERGING TECHNOLOGIES IN MEDTECH IN GREATER BOSTON

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ABSTRACT

The Greater Boston area is a globally renowned powerhouse in medical technologies due to the sheer density of academia, hospitals, industry, and government support that make up the innovation ecosystem. This report explores those factors, emerging technologies in medtech and general confidence in Boston's abilities to remain a top hub amidst a constantly changing healthcare landscape through thematic analysis of stakeholder interviews.

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Executive Summary

The Greater Boston area – and to a larger extent, the Commonwealth of Massachusetts – is a globally recognized powerhouse on the medtech front and has been for many years. The medical devices industry makes up a lion's share of the state's exports and contributes heavily to the local economy. This fact, paired with the presence of many research and teaching hospitals, clusters of higher education institutions and a unique innovation culture, make the Greater Boston area highly favorable for Dutch companies looking to venture into the US market.

This report explores the innovation ecosystem in the Greater Boston area and looks to contextualize key R&D needs and associated technical challenges. Part of the remit of Netherlands Innovation Network in Boston is looking to match Dutch innovations to the Greater Boston area's ecosystem to help strengthen the international partnership between the two, as part of the ongoing Program of Collaboration in Life Sciences & Healthcare between the Netherlands and Massachusetts. This report is intended to help Dutch entrepreneurs and researchers identify strategic opportunities to enter or expand their business in emerging technologies in medtech and makes three key recommendations for them as they engage with the Boston ecosystem.

In our research, we found that artificial intelligence is now all but ubiquitous, but Boston is still well placed to support other areas, such as robotics, photonics, imaging, sensing, nanotechnology, and organ-on-a-chip, due to the unique innovation ecosystem – and its resources – that exists here. The sheer density of industry, academia, hospitals, funding, and government support helps foster innovation at early stages, which is integral to emerging technologies in an R&D stage. Additionally, the COVID-19 pandemic highlighted many gaps in the healthcare system, as our stakeholders were quick to point out during interviews. As such, the Greater Boston area promotes strong synergy between all areas of its innovation ecosystem that make it a good place for Dutch entrepreneurs to form long-term partnerships and launch or scale their technologies.

Introduction

When it comes to the life sciences industry, Boston is the envy of the world. Around the globe, Boston is known to be a city unmatched in its life sciences and healthcare prowess due to its world class research institutions and universities, lab infrastructure, concentrated density of start-ups and venture capital, high level of public-private partnerships and government support for the industry. As a result, Massachusetts performs exceedingly well when it comes to innovation in healthcare. Nearly one in four exports from Massachusetts is a medical device and Massachusetts leads other US states when it comes to medical product exports as a percentage of total¹. The medical device industry also contributes significantly to the Massachusetts economy. The state also performs extremely well in innovation – ranking second for medical device patents and third for FDA 510(k) approvals². There is also a strong presence of medtech heavyweight corporations in the Greater Boston area, like Waltham-based Thermo Fisher Scientific, and Marlborough-based Boston Scientific. Notably, there is a strong presence of European corporations to be found here, with German Fresenius Medical Care and Dutch Philips both located in the region. Other Dutch start-ups have located to the Greater Boston area as well, including Cambridge-based LUMICKS. In terms of the number of medtech jobs in the state, there are estimated to be 20,400. The medtech contribution to the state’s economy is estimated to be upwards of \$7.6B as of 2021³. Furthermore, the Netherlands represents the greatest share of medical device exports to Massachusetts, with 12.7% of all exports coming from the Dutch⁴.

Even outside of the presence of Philips, LUMICKS and other Dutch organizations in the Greater Boston area, the Netherlands is no stranger to the innovation that comes out of the region. In July 2019, during an official economic mission, Prime Minister Mark Rutte, and other representatives from public investment agencies, the healthcare industry and more, travelled to Boston for an Economic mission, and signed Memorandum of Understanding to underline the strong connection between the two ecosystems. This MoU was signed by the Massachusetts Office of International Trade and Investment (MOITI) and the Netherlands Ministry of Economic Affairs and Climate Policy and was supported and co-signed by the Massachusetts Life Science Center, Health~Holland, the Termeer Foundation, MassBIO and HollandBIO⁵. In October 2022, as a follow-up, the signatories went on to sign a Program of Cooperation, wherein they set out concrete yearly actions to increase the flow of business, investments, talent, and research between the two ecosystems.

The medical technology industry in the United States is impacted by external conditions like federal and state policies, regulations, and financing. While these conditions can slow down research and innovation, the Greater Boston area proves time and time again that innovation in the region won’t be stifled. According to a Grant Thornton LLP and MassMEDIC report conducted in 2019, there are three key performance indicators for the medical device industry that indicate the strength of ecosystem. These KPIs include Innovation, Economic Impact and Talent.⁶ Massachusetts consistently ranks amongst

¹ Med Device Online, “New Industry Report Shows One in Four Exports from Massachusetts Is a Medical Device, MassMEDIC Announces,” Med Device Online (May 2019)

² Grant Thornton and MassMEDIC, “Medical Devices in Massachusetts: State of the Industry,” (July 2019)

³ AdvaMed, “Massachusetts Benefits from Medtech,” AdvaMed (August 2021)

⁴ Grant Thornton and MassMEDIC, “Medical Devices in Massachusetts: State of the Industry,” (July 2019)

⁵ Health~Holland, “Massachusetts and the Netherlands kickoff international partnership in life sciences,” (July 2019)

⁶ Grant Thornton and MassMEDIC, “Medical Devices in Massachusetts: State of the Industry,” (July 2019)

the top in the country in all KPIs, ranking second in the US for medical device patents (ranking first when adjusted for state GDP), ranking second for venture capital investment and third for total number of medical device employees. While the Grant Thornton and MassMEDIC 2019 report does indicate that despite these strong KPIs, some there are also indicators of falling performance though this is later refuted by leading experts in the field in the interviews conducted for this report.

There are also emerging technologies in healthcare, including robotics, imaging, sensing, photonics, nanotechnologies, organ-on-chip, and artificial intelligence (AI) that are disrupting the industry and also creating areas of opportunity for Dutch innovators looking to enter the market. Massachusetts – and the Greater Boston area specifically – paves the way in these fields due to a unique combination of factors that are difficult to replicate in other regions in the United States and will be explored in later sections.

This report is based on a literature review, combined with stakeholder interviews from leading industry experts in the Greater Boston area. The report then makes use of qualitative inquiry, specifically thematic analysis to examine the success of the ecosystem. This report also aims to provide relevant insights and observations for Dutch companies considering engagement or expansion into the Greater Boston Area's medical technologies industries by providing an overview of current trends and perspectives in the industry.

Approach

The findings in this report were guided by key takeaways from a combination of primary and secondary research, including a literature review comprised of existing reports and articles, stakeholder interviews from leading experts in the Greater Boston area and survey design of the Netherlands' medtech companies looking to enter or expand in the US market. The report utilized qualitative inquiry and specifically thematic analysis to guide our recommendations. The use of thematic analysis along with the literature review allowed the Netherlands Innovation Network to organize the data and insights from experts into patterns that provided context for the key takeaways for Dutch startups and scaleups.

For purposes of this report, the Netherlands Innovation Network in Boston defined the following "primary focus areas": robotics, imaging, sensing, photonics, nanotechnologies, organ-on-chip, and AI. These areas were selected based on trends observed in ongoing work conducted by the Netherlands Innovation Network in Boston over the course of the last four years.

Due to the qualitative nature of the report, interviewees selected was purposeful; individuals invited to interview were able to offer insight on the innovation ecosystem by bringing perspectives from years spent working in the ecosystem and/or from the type of roles they have in the ecosystem. An overview of all interviewees can be found in Appendix I.

Innovation Ecosystem

The Greater Boston area is the metropolitan region of New England, encompassing the City of Boston and its surrounding areas over the span of Suffolk and Middlesex counties. There are 43 cities and towns that are included in the Greater Boston area, notably including Cambridge, Quincy, Somerville, Waltham, and Wellesley.

According to 1776, a U.S Chamber of Commerce Foundation, in their 2017 "Innovation That Matters" report, the Greater Boston area is the most innovative location in the US local development landscape, outranking other areas like the Bay Area, Philadelphia and San Diego. There are several reasons for this, which will be explored in depth in this section of the report. First, the Greater Boston region is known for a high concentration of academic institutions within its boundaries (see Figure 1), including higher education institutions like Harvard, Massachusetts Institute of Technology, Northeastern University, Boston University, Tufts University, Boston College and the University of Massachusetts's five campuses.

Additionally, over the past three decades, the Greater Boston area (the Cities of Boston and Cambridge in particular) have developed public and private investments designed to boost various sectors such as education, financial services, high-tech and life sciences. In life sciences specifically, there is also a network of teaching hospitals that build on academic research that is supported by the National Institutes of Health. Each component plays a distinct role in the region's vibrant innovation ecosystem.

This section explores the various components of the Greater Boston area's innovation ecosystem as well as factors that make allow the innovation in Boston to thrive. There are a number of players involved in the Boston health and medtech ecosystem, including higher education institutions, teaching hospitals, innovation districts, VC, incubators, and accelerators. This list is by no means exhaustive but, for the purposes of this report, the Netherlands Innovation Network has identified key players in the ecosystem

and provided an overview here. Additionally, players with specific linkages to the focus areas defined in the previous section were also included.

Academic Institutions

This has been reiterated many times, not only in this report, but across literature and across industries, that the academic concentration of the Great Boston area is a unique driver for the region’s innovation ecosystem. The Greater Boston area is home to over 51 colleges and universities (see Figure 1).

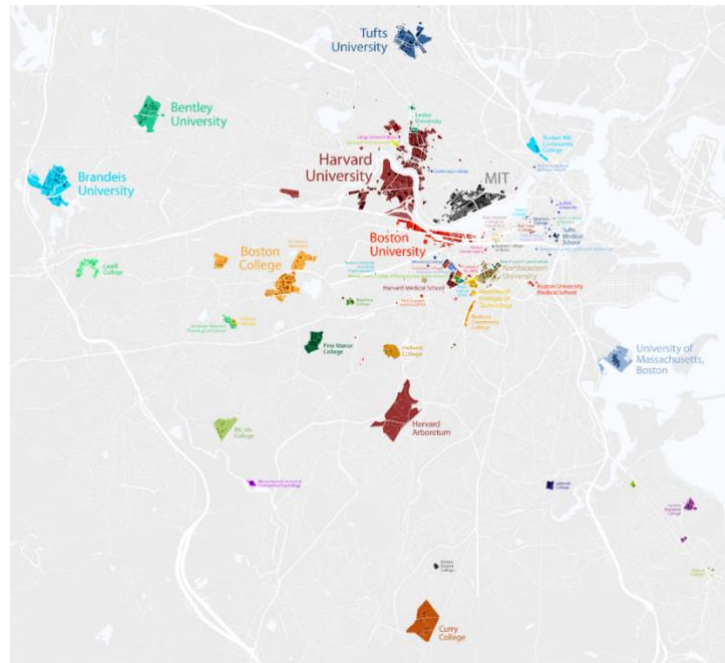


Figure 1 - Source: <http://www.radicalcartography.net/>

In addition to those anchor institutions, there is also a growing hub of biomanufacturing development and facilities with a significant amount of investment that has been poured into them. Over the past five years, \$1.9 billion has been invested into new or expanded facilities and academic centers.

Teaching Hospitals and Research Institutes

Teaching hospitals and their university affiliations and counterparts play a large and important role in the innovation of the medical device sector. More research is done in these institutions than in private industry and that results in the licensing of technology to medical device firms and occasionally in the formation of start-up companies or joint ventures with existing companies. The Greater Boston area is home to 25 hospitals and 20 community health centers, and the hospitals benefit greatly from the proximity to university in the Greater Boston area. Beyond the sheer number of hospitals in the Greater Boston area, the best indicator of innovation that comes from the region lies in the amount of funding received from the National Institutes of Health (NIH). The NIH is the largest source of funding for

biomedical research in the world. According to a 2019 report commissioned by the Boston Planning & Development Agency, Boston has consistently received the most NIH funds for 24 years. 58 institutions in Boston received 3861 NIH awards, totaling approximately \$2.1 billion in funding. 28 of those institutions received over \$1 million and eight received over \$100 million, all indicative of Boston’s collective excellence in biomedical research⁷. Of this segment, 67% of hospitals in Boston received NIH funding, compared to 30% received by universities, 1% received by research institutions and 2% received by private companies⁸.

According to a 2022 MassBIO Industry Snapshot, of the top 20 NIH funded hospitals in the United States, eight were located in the Greater Boston area. Boston also snagged the top two spots on the list. A snippet of that data is presented in Table 1 below.

Ranking	Hospital	Awards	Funding
1	Massachusetts General Hospital	1006	\$600,667,106
2	Brigham and Women’s Hospital	615	\$357,068,821
4	Boston Children’s Hospital	409	\$219,099,952
6	Dana-Farber Cancer Institute	269	\$159,777,039
8	Beth Israel Deaconess Medical Center	228	\$127,771,968
13	Boston Medical Center	80	\$56,213,699
15	McLean Hospital	82	\$44,492,104
18	Massachusetts Eye and Ear Infirmary	71	\$33,439,533

Table 1 - Top NIH funded Independent Hospitals of 2021 (Boston focus)⁹

The following list are Harvard Medical School affiliated teaching hospitals that play a significant role in the R&D that occurs in the region. Mass General Hospital (MGH), Brigham and Women’s Hospital (BWH) and Beth Israel Deaconess Medical Center (BIDMC), each have their own centers for digital health innovation.



Beth Israel Deaconess Medical Center (BIDMC) is consistently ranked each year as a “Best Hospital” by the US News & World Report and is one of the country’s preeminent academic teaching hospitals. Located in the Longwood neighborhood of Boston, Beth

Israel is also home to a renowned academic research program where scientific discoveries are helping to transform medical care, ranking third in the country for National Institutes of Health funding among independent hospitals¹⁰. By way of their Technology Venture Office, which accelerates the development of their researchers’ innovative and groundbreaking technologies through fostering of strategic

⁷ Boston Planning & Development Authority, “Boston: Most NIH funds for 24 Consecutive Years,” March 2019

⁸ Ibid

⁹ MassBIO, “2022 Industry Snapshot,” <https://readymag.com/MassBio/2022IndustrySnapshot/>

¹⁰ Harvard Medical School, “HMS Affiliates – Beth Israel Deaconess Medical Center”

collaborations with industry partners, they have accelerated and helped to develop a number of medical technologies ranging from devices, diagnostics, imaging, supplements, pharmaceuticals, and software.¹¹



Massachusetts General Hospital (MGH) is the largest hospital in the New England region, located in the West End neighborhood of Boston. Like Beth Israel, MGH also rates consistently amongst the “Best Hospitals” in the country¹². MGH is also a research leader, conducting the largest hospital-based research program in the world and operating with an annual research budget of \$1B+. The hospital is home to fundamental research labs investigating the basic building blocks of life as well as a clinical research program with approximately 1,200 active clinical trials. The hospital has six thematic research centers: The Center for Systems Biology; The Center for Regenerative Medicine; The Center for Genomic Medicine; The Wellman Center for Photomedicine; The Center for Computational and Integrative Biology; The Ragon Institute of MGH, MIT and Harvard. MGH is part of Mass General Brigham, a Boston-based non-profit hospitals and physicians’ network, which is the largest employer of all of Massachusetts¹³. MGH also is one of the top ten recipients of NIH funding in the United States, receiving \$466 million in 2018¹⁴.



Brigham and Women's Hospital (BWH) is also consistently ranked by the US New & World Report as a “Best Hospital.” BWH is known for their expertise in heart and vascular care, cancer care, orthopedic and arthritis treatment, neurological and neurosurgical care, women’s health and virtually every other area of adult medicine. BWH is the second most NIH-funded hospital in the US and has been fostering innovation firsts, including organ transplantation and mitral valve surgery¹⁵. BWH’s annual research budget is upwards of \$630 million¹⁶. BWH, along with MGH, is part of Mass General Brigham.



Boston Children's Hospital is the largest, as well as the number one, pediatric hospital in the US. Children's is also home to the world's largest research enterprise based at a pediatric hospital, receiving the largest chunk of pediatric research funding from the NIH¹⁷.

¹¹ Beth Israel Deaconess Medical Center, “Technology Ventures – Our Products and Companies”

¹² Harvard Medical School, “HMS Affiliates – Massachusetts General Hospital”

¹³ Sean McFadden, “Massachusetts’ Largest Employers,” Boston Business Journal (August 2021)

¹⁴ Boston Planning & Development Authority, “Boston: Most NIH funds for 24 Consecutive Years,” March 2019

¹⁵ Harvard Medical School, “HMS Affiliates – Brigham and Women’s Hospital”

¹⁶ Brigham and Women’s Hospital, “Awards, Honors & Grants News”

¹⁷ Boston Children’s Hospital, “About Us”



Dana-Farber
Cancer Institute

Dana-Farber Cancer Institute provides cancer patients with the best cancer care possible today, while advancing tomorrow's cures through intensive basic and clinical research. Dana-Farber's research discoveries include the development of Gleevec to treat chronic myeloid leukemia. The Robert and Renee Belfer Office for Dana – Farber Innovation (BODFI) helps to facilitate the process of commercializing technology.

Innovation Districts

For the scope of this report, the Netherlands Innovation Network focused its efforts on identifying innovation districts relevant to innovation in medtech and medical devices. For that reason, public-private partnerships were not included in this literature review. Instead, due to their relevancy to medtech and medical devices and innovation specifically, this section will focus on private-led initiatives like the Cambridge Innovation Center (CIC) and MassChallenge as well as public driven regeneration initiatives like Kendall Square and Seaport District.

Kendall Square

The history of Kendall Square is intrinsically tied to two factors that make it known as the “most innovative square mile on the planet.” The first factor in Kendall Square's innovation prowess is the presence of MIT. Located in Cambridge at the intersection of Main Street and Broadway, Kendall Square is an internationally recognized innovation district that has a high concentration of entrepreneurial start-ups as well as for the quality of innovation that has emerged from the square since 2010.

The beginning of the district' healthcare innovation cluster dates back to 1976 with debates about the then-emerging field of recombinant DNA. During that summer, Harvard University announced plans to construct a high-containment lab in the square that would experiment with recombinant DNA. It faced fierce opposition from the then-mayor of Cambridge, Alfred Vellucci. After a three-month moratorium, the City of Cambridge passed regulations that provided certainty for research and development organization. One of the first entrepreneurs benefit from this cluster was the Dutchman. He is considering a pioneer and the founding father of biotechnology. The foundation that was found in his name, the Termeer Foundation, is focused on connecting life science innovators and catalyzing the creation of new medicines.

Today, Kendall Square is home to over 150 high tech, life science and pharmaceutical companies in all stages. Our colleagues of Swissnex Boston host a podcast called Tectonic and, in a previous episode, they discussed the “most innovative square mile on Earth,” with Bob Buderer, author of *Where Futures Converge*, a book published in 2022 about Kendall Square and is the first detailed account of the ecosystem¹⁸.

¹⁸ Karch, Brendan, Interview with Bob Buderer, *Tectonic – Swissnex*, Podcast audio, July 27, 2022, <https://swissnex.org/boston/nextcast/tectonic-mini-season-episode-02-the-most-innovative-square-mile-on-earth/>

Seaport District

In 2004, the Boston Planning Development Agency (BPDA), known then as the Boston Redevelopment Agency, launched the “Lifetech Boston” policy initiative that was a significant push to the creation of the innovation district in Boston. While not as established as Kendall Square, the emergence of Seaport has been well-timed to a recent surge in the Massachusetts medtech and biopharma industries. The appeal of Seaport for life sciences companies is its ability to appear to top talent inclined to work in one of the US’s leading metro areas for careers in these fields¹⁹. As lab space is becoming increasingly difficult to obtain in the Cambridge area, the Seaport District offers an alternative location that still has close proximity to the cluster in Kendall Square. With three million square feet of space available for immediate occupancy (as of 2019), Seaport has the capacity to address concerns for current needs and future expansion, making it an alternative to the near full occupancy of Kendall Square²⁰. Organizations like Vertex Pharmaceuticals and Gingko Bioworks are prime examples of successful life science companies headquartered in the Seaport and making use of the resources available.

Cambridge Innovation Center and Venture Cafe



The **Cambridge Innovation Center (CIC)** is a real estate services company that touts itself as a “community of entrepreneurs.” Initially established in 1999 as an incubator that was unsuccessful, it rebranded into an innovative co-working space in 2010. As neither incubator nor accelerator, CIC has been following a framework of private entrepreneurial activity based on renting shared and flexible office space. There are two locations in the Greater Boston area: Downtown Boston and Kendall Square. With its open and flexible work culture and the inherent encouragement of movement across locations, cross-fertilization of ideas is not only natural but considered to be a major asset to innovators. For example, the CIC has set itself up to be a major facilitator in the Boston innovation ecosystem by established a Relationship Manager on each floor of its offices, thus making it easier for entrepreneurs to find specialized services within the CIC itself. There are also other CIC locations across the US and globally, with a location most notably in Rotterdam²¹. The Venture Café, on the other hand, is hosted at the Kendall Square location and connects a community of innovators, entrepreneurs and small businesses through free, semi-structured programming and events every Thursday in a more casual setting. While the social context between CIC’s standard co-working model and the Venture Café differs, the purpose is the same: enabling collaboration across the Boston innovation ecosystem.

Incubators & Accelerators

The Greater Boston area is home to some large and globally recognized incubators and accelerators. The following list is of incubators and accelerators that focus specifically on medtech and medical devices.

¹⁹ Jeffrey Steele, “Seaport Ushering in Sea Change for Life Science Employers,” Forbes (December 2019)

²⁰ Ibid

²¹ Netherlands Foreign Investment Agency, “Cambridge Innovation Center Expands to the Netherlands,” Invest in Holland (July 2015)

While this list is by no means exhaustive, it helps shape’s the understanding of how key players in Boston’s innovation ecosystem interact and contribute to the emergence of new and novel technologies in the field.



MassChallenge is a non-profit, zero-equity startup accelerator that was founded and headquartered in Boston. There are additional locations in the US (Texas and Rhode Island) and globally (Israel, Mexico, and Switzerland). While MassChallenge is industry agnostic and early-stage, they also have strategic focus on high impact, emerging categories that include FinTech; HealthTech; Blue Tech; Enterprise Technology; Safety and Security; Space Commercialization; Sports Tech; Sustainable Food Systems; and The US Air Force Lab. **MassChallenge HealthTech** was launched in 2016 and to establish the digital health innovation arm of

MassChallenge. MassChallenge’s overall mission and model is designed to drive connectivity and density across all stakeholders (see Figure 2). Over the years since it was founded, MassChallenge has accelerated 2928 startups and raised \$8.6B in funding.

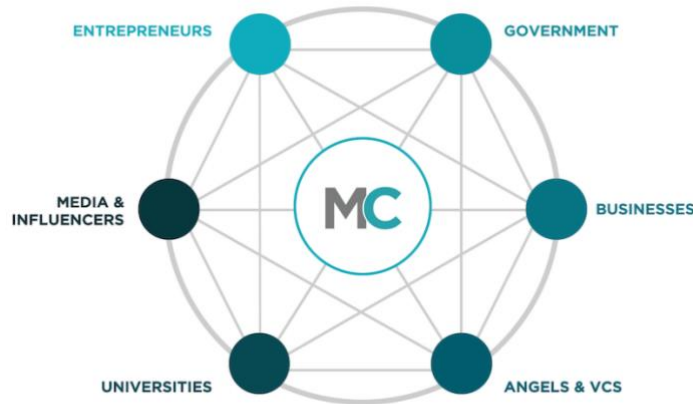


Figure 2 - MassChallenge Model for Connectivity across stakeholders²²



M2D2

Massachusetts Medical Device Development Center & Biotech Incubator, or M2D2, is an incubator housed at UMass Lowell. M2D2 is a joint venture between UMass Lowell and UMass Chan Medical School in Worcester, MA and is meant for earlier stage and smaller companies. Every year, M2D2 hosts a \$200K challenge focused on identifying and rewarding disruptive

²² MassChallenge, “About MassChallenge,” Retrieved from <https://masschallenge.org/about>

companies in the medical technology and biotechnology industries. Sponsors include corporates like Johnson & Johnson, Thermo Fisher Scientific, Amgen, JP Morgan and more.



MassRobotics is an independent, non-profit organization serving as the innovation hub for robotics and connected devices. Mass TLC (Massachusetts Technology Leadership Council) lay the groundwork for MassRobotics in 2004 with the creation of the Mass Robotics Cluster. The full innovation center that became MassRobotics didn't come in fruition until 2015²³. Since then, MassRobotics has provided entrepreneurs and innovative robotics startups with workspace and resources they need to develop, prototype, test and commercialize products and solutions.



Launched by MIT, **the Engine** is a venture firm that offers both resources and an accelerator investment to Tough Tech companies (biotech, medical devices, manufacturing, clean energy, robotics, and other technology sectors that take significant time and resources to develop). The Engine was spun out after MIT President, L. Rafael Reif, articulated in an op-ed to the Washington Post about the challenge of finding support to develop Tough Tech ideas. The Engine was established in 2016.



The **Venture Development Center (VDC) at UMass Boston** opened in 2009 to enable the most promising entrepreneurial talent from around the world, whatever their university, to move or remain in Boston after graduation to realize their dreams. Today, their thriving community includes entrepreneurs in residence launching innovative technology and life science companies in their award-winning incubator. Industries covered at VDC include healthcare, biopharma, medical devices, finance, software, electronics, and nanotechnology.

Research Institutes & Other Organizations with R&D Focus

Boston's medical, academic, biotech and healthcare institutions received \$2.3B across 4097 research grants from the National Institutes of Health (NIH) in FY20. Prior to FY18, Boston had received the most NIH funding of any US city for over 20 years. Additionally, Boston's NIH funding represented 68.5% of for all Massachusetts NIH grant recipients.

Hospitals and health centers received the lion's share of Boston's NIH funding at \$1.5B. Three hospitals (Massachusetts General Hospital, Brigham and Women's Hospital and Boston Children's Hospital) alone account for 71.5% of all of Boston's funding to hospitals and health centers from the NIH.

²³ MassTLC, "Case Study: How MassTLC Helped Facilitate the Creation of a Robotics Innovation Hub," (February 2017)

NIH grants represent the single largest public funding source for medical research worldwide and Boston's consistently high award reflects the city's continued national leadership in medical research.

The following list of research institutions have been identified as major contributors to innovation in the emerging technologies in medical devices and also have a health application focus.



Founded in 1996, the **Massachusetts Medical Device Industry Council (MassMEDIC)** is the largest regional medtech association in the US, with over 300 members across sectors: manufacturing; product development; suppliers; research institutions; and academic health centers. Their role as a regional medtech association also means that they advocate for public policy that supports medical innovation. MassMEDIC also offers a virtual accelerator for medtech entrepreneurs called IGNITE. IGNITE is a training, mentorship and networking program and is supported in part by a grant from the Massachusetts Life Sciences Center.²⁴



Brigham Digital Innovation Hub (iHub) is the center for digital health and innovation across Brigham and Women's Hospital. Founded in 2013, iHub launched as a resource center for innovators at Brigham and Women's Hospital to advance their

ideas for bringing care and bringing technology-based ideas to solution. Since then, iHub has become a connection point between Brigham and the broader innovation ecosystem to help enable and advance collaboration.



Founded in 2009, the **Wyss Institute for Biologically Inspired Engineering**, more commonly known as the Wyss Institute, is a cross-disciplinary research institute at Harvard University focused on bridging the gap between academia and industry in focus areas such as Bioinspired Therapeutics & Diagnostics; Diagnostics Accelerator, Molecular Robotics; 3D Organ Engineering; Predictive BioAnalytics; Immuno-Materials;

Synthetic Biology; and Living Cellular Devices. The institute also has a focus on application, intellectual property generation and commercialization.

²⁴ IGNITE MEDTECH, "About Ignite." Retrieved from <https://www.ignitemedtech.com/about>



Founded in 2004, the **Eli and Edythe L. Broad Institute of MIT and Harvard**, more commonly called simply, the Broad Institute, is a biomedical and genomic research center located in Kendall Square. What is unique about the Broad Institute is

that it is a nonprofit research organization that convenes a community of researchers across many disciplines and is affiliated with the following five Harvard teaching hospitals: Beth Israel Deaconess Medical Center, Boston Children's Hospital, Brigham and Women's Hospital, Dana-Farber Cancer Institute and Massachusetts General Hospital.



Established in 2007, the **Koch Institute for Integrative Cancer Research** is a cancer research center affiliated with MIT and is also one of eight National Cancer Institute-designated basic research centers in the US. Their research combines interdisciplinary inquiry and technological innovation to

accelerate the discovery and application of new ways to detect, monitor, treat and prevent cancer. However, unlike many NCI Cancer Centers, Koch Institute focuses solely on the research aspect and will not provide medical care or conduct clinical research. The Koch Institute focuses on five research buckets critical to controlling cancer: developing nanotechnology-based cancer therapeutics; creating novel devices for cancer detection and monitoring; exploring the molecular and cellular basis of metastasis; advancing personalized medicine through analysis of cancer pathways and drug resistance; and engineering the immune system to fight cancer.



First established in 1998, the **Consortia for Improving Medicine with Innovation and Technology**, or CIMIT, is a network of academic and medical institutions partnering with industry and the government. Their mission is to foster collaboration among

clinicians, technologists, and entrepreneurs to accelerate innovation and catalyze the discovery, development, and implementation of innovative healthcare technologies. Since its founding, CIMIT has had a relationship with the US Department of Defense, and much of its early as well as part of its ongoing funding has been from the US Army Medical Research and Materiel Command.



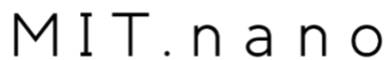
The **Artificial Intelligence in Medicine Program** at Harvard (AIM) is housed at Mass General Brigham and brings together investigators from Harvard-affiliated hospitals as well as academic institutions to accelerate the application of AI algorithms in medical sciences. AIM consists of multiple independent laboratories and centralizes AI expertise stimulating cross-pollination among clinical and technical

expertise areas. The Director of AIM is Dr. Hugo Aerts who earned his PhD from Maastricht University.



Boston University Nanotechnology Innovation Center, known as BUnano, is an interdisciplinary collaborative research center that fosters research and education in nanoscience, nanoengineering and nanotechnology to address challenges in medicine, manufacturing, and energy. BUnano’s objectives are to advance research and training in nanoscience and nanotechnology and facilitate

translation of scientific discoveries of BU faculty to the market.



MIT.nano is the largest open access research facility of its kind, located in the heart of MIT’s campus. Opened in 2018, the mission of MIT.nano is to harness the power of the nanoscale to solve the world’s greatest challenges. While the research conducted at MIT.nano is industry agnostic, in health and healthcare, research is

conducted in personalized and targeted nanoscale medicine.

Government and Policy

The Commonwealth of Massachusetts has a long legacy when it comes to government support for the life sciences sector. At the State and City level, there is prioritization of this sector. Not only is there institutionalized precedent of support of the sector through the enactment of the Massachusetts Life Sciences Act and the creation of quasi-public organizations like the Massachusetts Life Sciences Center (an economic development and investment agency), but also regional approaches to economic development in the sector with the establishment of the Life Sciences Corridor.

The Life Sciences Corridor is a partnership between and spans five cities in the Greater Boston area: Somerville, Cambridge, Boston, Quincy, and Braintree. The partnership, created by former mayors Martin “Marty” Walsh (Boston), David Maher (Cambridge), Thomas Koch (Quincy), Joseph Curtatone (Somerville), and Joseph Sullivan (Braintree), was established in 2014 and focuses on promoting the collective and collaborative life sciences sector along the MBTA red line in the Greater Boston Area and has over 450 companies within the cluster²⁵ (see Figure 3).

²⁵ Life Sciences Corridor, “About Us,” Retrieved from <https://lifesciencescorridor.com/about-us/>



Figure 3 – Life Sciences Corridor, representing the partnership and connectivity between five major cities

The Massachusetts Life Sciences Act was enacted in 2008, signed into law by then-Governor Deval Patrick, which enabled a \$1B package to support the industry over a ten-year period (with funding ending in 2018). This was a sweeping package that supported tax incentives, infrastructure improvements and low interest loans – all designed to stimulate job growth and solidify Massachusetts as a leading state for the industry. This Act was considered wholly successful despite an attempt to repeal it in 2010 – the industry is thriving and remained successful during the nationwide difficulties created by the COVID-19 pandemic.

Patrick’s successor, Governor Charlie Baker, signed a \$623 million life sciences bill in for the continued investment in the industry in 2018²⁶, after the MA Life Sciences Act’s ten-year period was up. This bill authorized the state to borrow and spend up to \$473 million over a five-year period (ending in 2023). The Massachusetts State Legislature also earmarked \$150 million for investments in research and facilities across the five campuses of the University of Massachusetts public universities.

The re-authorization of the Life Sciences Act through the bill in 2018 reiterates the Commonwealth’s stance on taking a proactive role in supporting economic development and innovation to continue forging a path as a global leader in the industry.

Massachusetts also has a long history with quasi-public organizations in deep tech industries, like the aforementioned Massachusetts Life Sciences Center. A quasi-public organization is defined as a company in the private sector that is supported by the government with a public mandate to provide a given service, and is overseen by an appointed board, commission, or committee.²⁷ MassVentures, a venture capital firm funded by the Commonwealth by investing in early stage, high growth startups in deep tech, is another example of a quasi-public organization.

MassVentures is a venture capital firm whose mission is to support the innovation economy and the economic growth initiatives of the Commonwealth by transferring research and early-stage innovations to viable businesses and jobs.²⁸ MassVentures has a wide offering of services, but their two most prolific programs include MV Capital, their deep tech venture funds, grant programs and revenue-based loans and MV Accelerate, their technical assistance offerings in which they have a broad partnership with many academic institutions and hospital systems in the area. According to Crunchbase, MassVentures

²⁶ UMass Medical School Communications, “Gov. Baker signs Life Science Bond Bill, continuing state’s investment in biomedical research,” (June 2018)

²⁷ Investopedia, “Quasi-Public Corporation,” https://www.investopedia.com/terms/q/quasi_public_corporation.asp (April 2021)

²⁸ MassVentures. *Who we serve*. Retrieved from <https://www.mass-ventures.com/who-we-serve>.

has made 275 investments to date, with their most recent investment into Boston-based medical device company, PathMaker Neurosystems on June 8, 2022.²⁹

The Massachusetts Technology Collaborative, or MassTech, is another quasi-public organization that supports business formation and growth in the state across many technology and innovation sectors. Their work is split into various divisions dependent on sector and industry. To achieve their goal of helping Massachusetts lead in the global digital economy, they build strategies and connections across industry, academia, and government, launching programs that invest in infrastructure, promote workforce development, and raise the profile of state's key innovation industries. Their division focused on healthcare innovation is the Massachusetts eHealth Institute, or more commonly known as MeHI. MeHI manages many programs including, but not limited to, an ongoing program to connect growing companies with digital health research and development hubs in the state ([the Digital Health Sandbox Program](#)), an effort to boost growth of startups through [health tech-focused accelerators](#), and an initiative to [promote healthy aging and support family caregivers](#).

Industry, Startups, and Investments

According to datasets retrieved from D&B Hoovers, there are over 900 medical device companies located in the Greater Boston Area.³⁰ As aforementioned, corporations as large as Boston Scientific, Fresenius Medical Care and Philips are located in the region but there is also a large startup ecosystem that remains the beating heart of funding activity in the region.

In addition to conducting interviews, the Netherlands Innovation Network was able to obtain datasets from Pitchbook³¹ as part of this literature in order to identify funding trends. The correlation between funding and innovation goes hand-in-hand in Boston where start-ups, researchers and investors are often networking in the same circles, due to the connectivity of all aspects of the industry in the Greater Boston area.

Massachusetts is second in the country for total VC capital raised and this shows both in the sheer number of medical device companies as well as how successful they are at raising capital. Looking at a sample size of 45 medical device companies in the Greater Boston area that have less than 100 employees and up to \$125M in revenue, a strong snapshot of this ecosystem emerges.

Out of the 45 companies selected, the average amount of capital raised was over \$26 million dollars each with a total of over \$1.1 billion dollars across all companies. Taking into consideration both the size of the companies and the general difficulty of raising money early on, this indicates the relative strength of the startup scene.

²⁹ Crunchbase. Retrieved from https://www.crunchbase.com/organization/massventures/recent_investments.

³⁰ D&B Hoovers (n.d.) [List of medical equipment and supply companies in Massachusetts]. Retrieved July 2022 from app.dbhoovers.com

³¹ Pitchbook (n.d.). Medtech Revenues - \$125M Revenue. Pitchbook. Retrieved August 2022 from <https://www.pitchbook.com>

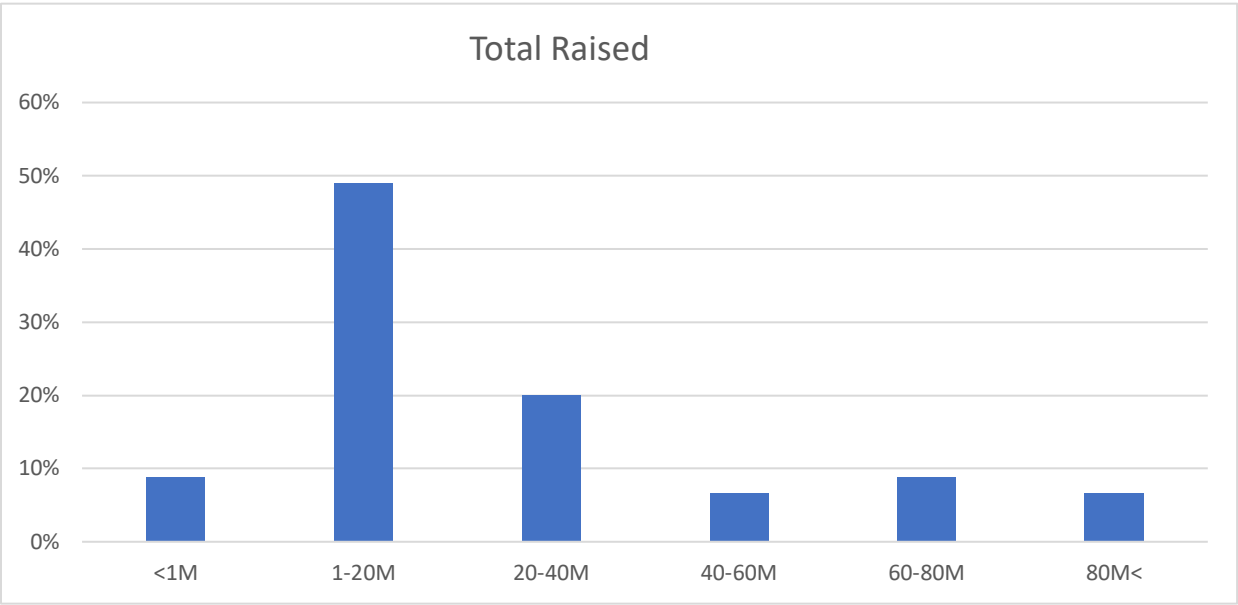


Figure 4 – Percentage of companies and capital raised

Companies with an impressive amount of capital raised early on skew these averages (\$26M) and tend to paint a picture that is not realistic for most startups to achieve. However, funds raised for medical device startups in the Boston area show a good distribution of availability. It is interesting to note that capital raised at the higher end of the spectrum, with 16% of companies getting more than \$60M. The highest single amount raised by a single company in this group was a whopping \$132M. Additionally, over 50% raised up to \$20M. The ecosystem in Boston is not just an incubator market; these numbers show both availability of capital for companies to mature, while also demonstrating access to capital for early-stage companies looking at their Series A round of funding.

When drilling into sources of capital for these companies, we begin to see a clear trend in who is most active in investing in this ecosystem. 34 out of 45 companies (75%) were able to source all of their capital from just one source while the other 11 found success in multiple funding streams.

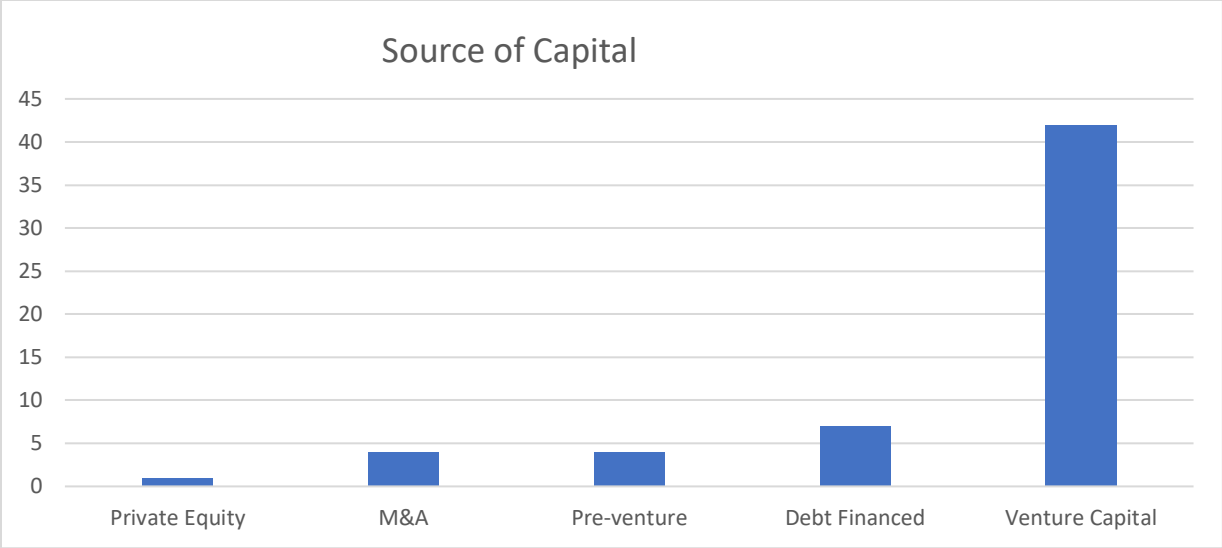


Figure 5 – Individual sources of capital by count across 45 companies

It is interesting to observe that private equity, pre-venture, M&A, debt financing and grants are all available sources in Boston and invested in the 45 companies, venture capital was the clear leader. 42 companies (93%) raised capital with VCs at some point since their founding. The strong presence of VCs in the Boston area also demonstrates that a large number of influential VCs are actively watching and participating in the sector. For smaller and/or earlier stage startups, this can be a great asset in both the procurement of funding but also access to knowledge and a larger network.

Access to multiple sources of capital combined with resources circulating in this ecosystem is a strong indicator of the success of medtech investments in the Greater Boston area.

Methodology

As part of the qualitative research for this report, the Netherlands Innovation Network spoke with leading experts in the Greater Boston Area to solicit their views on emerging technologies and to speak to the importance of different attributes or characteristics of these technologies in their applications. These experts have been involved in the industry for a number of years, many in multiple roles and organizations over the years. Ultimately, seven total stakeholders were interviewed in a semi-structured manner and were told that as part of the report, the Netherlands Innovation Network was looking to gain conversational insights with each expert to share with Dutch innovators looking to engage in the Greater Boston ecosystem.

Each interviewee was provided with a list of the questions prior to the interview and all consented to participate. The recorded interviews lasted up to 60 minutes.

The following organizations were consulted during our research:

Cambridge Innovation Partners, Massachusetts eHealth Institute, MassMEDIC, Mass Medical Angels, M2D2, and LUMICKS. These organizations range from quasi-public to venture capital to for-profit companies in the interest of providing a robust snapshot of perspectives in the industry on emerging technologies in healthcare.

The report then utilized thematic analysis to interpret the insights shared by ecosystem stakeholders. Thematic analysis is a method of analyzing qualitative data that is applied to a set of texts, including interviews.³² Though initially popularized by psychologists Virginia Braun and Victoria Clarke, thematic analysis today is one of the most common forms of analysis within qualitative research across disciplines. A thematic analysis strives to identify patterns of themes in the interview data. One of the advantages of thematic analysis is that it's a flexible method which you can use both for explorative studies.³³ Braun and Clarke (2006) provided a six-phase framework that was applied while conducting thematic analysis of the interviews. The phases are outlined below:

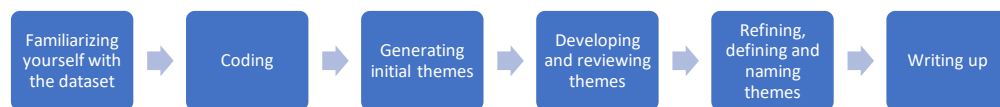


Figure 6 - Braun and Clarke's six phase process for thematic analysis

³² Braun, V. & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77-101.

³³ Mortensen, D. H. (2020). How to do a thematic analysis of user interviews. The Interaction Design Foundation. Retrieved August 23, 2022, from <https://www.interaction-design.org/literature/article/how-to-do-a-thematic-analysis-of-user-interviews>

Interview Outcomes

From the interviews conducted, the Netherlands Innovation Network was able to construct a narrative of themes to help Dutch innovators comprehend and engage with the medtech innovation ecosystem in Greater Boston. The interviews, conducted via videoconferencing or in-person, depending on the preference and availability of each stakeholder, were recorded, and then transcribed by the Netherlands Innovation Network. The transcriptions were then reviewed to determine commonality and patterns between each interview. Themes that emerged were then reviewed against the interview transcripts and literature review to ensure they fit in relation to the scope of the report.

The themes were grouped into three main sections: a natural competitive edge, interdisciplinary connectivity, and no shortage of funds.

With regards to emerging technologies and the Boston innovation ecosystem, it is widely agreed amongst the interviewees that the Greater Boston area is uniquely situated to support the wide range of emerging technologies identified. The top technologies, their applications and relevant companies identified by interviewees are presented in a confidence matrix at the end of the section.

Theme 1: A natural competitive edge

A theme that emerged very quickly from the interviews was Boston's natural competitive edge in the emerging technologies in the medtech space due to a number of factors that were also explored in the literature review of this report. Trevor Brown, Vice President, and General Manager of the Americas at LUMICKS, credits Boston's success as an innovation ecosystem to the proximity of everything – high quality academic and research institutions that are strong in engineering, physics, computer sciences and other technology segments as well as a strong hospital system in the area that is ideally placed to access skilled labor from these institutions. This provides a natural anchor in the innovation ecosystem.

Chief Operating Officer of MassMEDIC, Rachel Robinson, finds that there is a global draw in the convergence of all types of technologies in the Greater Boston area. From robotics, to AI, imaging, sensing and more, there is real opportunity in the clusters of industry that exist in this ecosystem simply because everything is already located here. There are companies that are doing innovative, life-changing work in all of the emerging technologies that the Netherlands Innovation Network identified. The challenge, however, is helping them to all talk to one another as it is easy to get siloed into your specific discipline.

Theme 2: Interdisciplinary connectivity

Another theme that emerged from the interviews was the connectivity between different disciplines in the Greater Boston area. MeHI Director Keely Benson and Sr. Program Manager Katherine Green would further venture that the proximity of the clusters both leads to healthy competition and also lends to increased collaboration, which in turn strengthens the innovation ecosystem. According to Brown, the connectivity of Boston's medtech innovation ecosystem is also one that is not easily replicated in other geographic areas. Abi Barrow, Managing Partner of Cambridge Innovation Partners, credits the Greater

Boston area's size and density by providing a comparison to another leading medtech hub in the United States: San Francisco.

"If you're in the Bay Area, it takes you 2 hours to get out of the city and into the Valley. If you're in Boston, it is so easy to get to see other people, get to work with other people. Companies here can do five or six meetings in one day but that's not the case in other areas."

She also reminds us that the strength of the medtech ecosystem in Greater Boston comes from cross-pollination between different sectors here. "It's not just life sciences. Massachusetts has a huge and historic manufacturing base that feeds into many other sectors. There is an openness in transitioning to biotech manufacturing from working with polymers for the plastic industry that is harder to do elsewhere."

Theme 3: No shortage of funds

Boston has been the top city to receive NIH funding for nearly the past two decades and that is vital to innovation in the medtech space – especially when looking at emerging technologies. What is interesting is what emerges after the R&D stage. Companies in the R&D stage have access to an ample amount of capital.

While the COVID-19 pandemic proved to be good for funding into medtech and, as an extension, medical devices, there is worry in the industry about decreased funding over the past year. Robinson does not share that same worry, noting that that funding is always a challenge, but it comes and goes in cycles and waves. "In Boston, we're in a down cycle," she concludes. "There's plenty of capital out there but people are investing it slowly, being pickier about where it goes."

Brown would also point out that while there is never a lack of money, the challenge is getting started. There is, however, a silver lining. Brown also underscores the fact that academic institutions in the area are becoming adept at managing the intellectual property and developing it in an early-stage commercialization, as opposed to quickly handing off licenses early on. "It used to be that we have a technology and want to license it out to another company. In many cases, a lot of times now, these companies are being formed within the confines of academia or a hybrid."

On the academic institution front, Richard Meiklejohn, Innovation Leader at M2D2, agrees and considers academia's role in the ecosystem as fundamental. Regarding funding, he is optimistic that the Boston ecosystem will continue to be able to fund innovation into the future but cautions that continued investment at the state and federal level and the allocation of that investment is critical – including into general infrastructure, which impacts affordable housing, public transportation, and sustainability.

Confidence Matrix of Emerging Technologies in Greater Boston

Out of all areas of emerging technologies pre-identified by the Network, there were a few that interviewees were able to validate more so than others – though sentiment generally remained that the Greater Boston area is situated well to support innovation in all fields. Consistently, the fields of robotics, nanotechnology, imaging, and sensing were cited as high potential areas to keep an eye on.

There was general excitement about the potential of organ-on-a-chip but a sense that the technology has not developed enough despite the potential. Photonics had mixed feelings from the interviewees, some citing it as an area with great potential, whilst others were not so convinced. Across the board, interviewees felt as though AI and machine learning, as an emerging technology, has reached a place of maturity and will no longer be enough of a draw on its own as it overutilized and overpromised. Instead, it is the view of the interviewees that AI will be integrated into many aspects of healthcare delivery, becoming a cornerstone of the sector in its own right, as it is still an impactful area. Barrow notes that, “we need to cut through the hype.” This finding aligns with a previous report done by the Netherlands Innovation Network. It was found in this report that the life sciences and health industry is leading the way in AI application in the region due to close links between research and industry³⁴.

The following table organizes the anecdotal data collected from interviewees in the fields aforementioned and how it interacts with the medtech innovation ecosystem in Boston on a scale that measures potential and general confidence in how these technologies will address healthcare challenges.

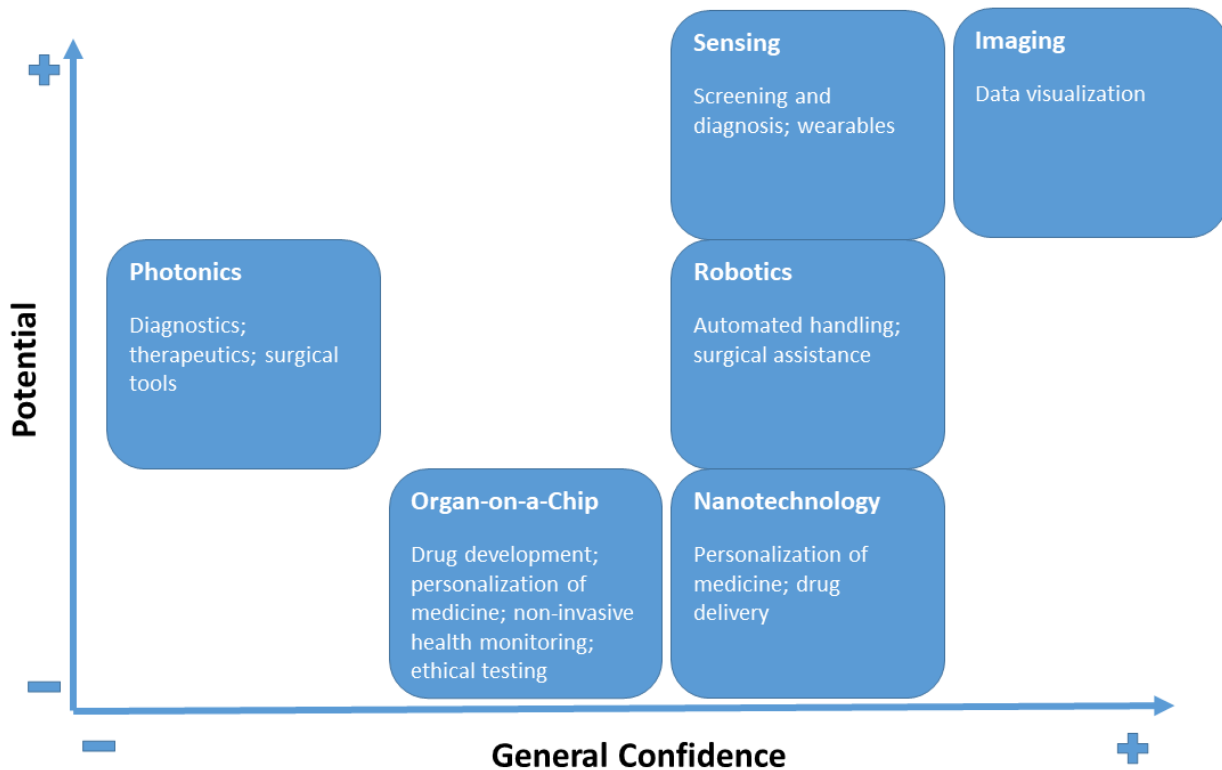


Figure 7 - Confidence matrix in emerging technologies (as discussed by interviewees, with use cases)

³⁴ Ustebay, Z. (2021) The New England AI Innovation Ecosystem. Netherlands Innovation Network. Retrieved from <https://www.rvo.nl/sites/default/files/2021/10/Boston-The%20New-England-AI-Innovation-Ecosystem.pdf>

Recommendations

The Greater Boston area is a natural partner to the Dutch in medtech and this commitment to a partnership has been reaffirmed many times over the years. Continued partnerships in R&D, commercialization and more in these emerging technologies enable opportunities for both new and established innovators.

Based on the analysis of the literature review and interviews, this report issues three recommendations to Dutch medtech companies. Some of what is reflected in these recommendations can also be applied to other ecosystems, but, given the distinctiveness of medtech in Greater Boston, make it worth acknowledging and reiterating.

Know the ecosystem and resources

Boston's thriving medtech ecosystem is credited to a number of factors: funding, talent, academia, government, etc., making Boston uniquely positioned to help facilitate the success of Dutch medtech innovation. However, the sheer number of resources in this ecosystem can be daunting to wrap one's head around. Therefore, comprehension and awareness of resources available in the ecosystem is productive to success. The Greater Boston area presents strong opportunities to acquire grants, participate in accelerator programs and partner with VCs. Dutch medtech innovators can capitalize on this with a strong strategy in their approach to the ecosystem. Additionally, it's important to underscore the potential for partnerships with academia and the role they play in acquiring talent, as well as managing intellectual property and licensing. Interdisciplinary linkages between American and Dutch companies made through networking or R&D collaborations can assist with manufacturing or M&A as needed. Finally, due to the vast number of resources and partnership potential in Greater Boston, strategic approach is essential; just because a resource is available does not mean it needs to be utilized or is a good fit.

Constantly diversify and adapt

As Dutch medtech innovators continue to grow in the Boston ecosystem, they should look for opportunities to diversify their technology. As we have seen with robotics, the market accepted solution of using robotics to perform surgery has proven an inability to lock surgeons out of an operating room any time soon. What we are seeing is robotic assistance helping surgeons perform surgeries better. The flexibility of robotics innovation has helped it to continue to be viable across multiple use cases, contributing to its early successes. However, we are seeing interdisciplinary innovation increasingly matter in the healthcare space and there is real opportunity in the Greater Boston area for that convergence and hybridization of technologies. Where Boston shines is in its various clusters of research and talent. Due to the competitive advantage of the proximity of all the clusters, there is global draw to the city and its expertise. Therefore, approaching opportunities to diversify and adapt technology is easier in a diverse environment such as Boston and sets up long-term success.

Forward looking

Since many of the emerging technologies will impact the market in the next 5-10 years, having a good grasp of the full ecosystem with an eye to future trends will help an innovator contextualize and predict use cases. The healthcare market is quickly changing due to the rapid pace of technological advancement. Each of these advancements have the potential to drastically alter aspects of the healthcare industry and understanding how these innovations will help to change, enhance, or inhibit the technology will ensure the innovation remains viable for commercialization. Regardless of hybridization or focused solutions, one way to remain informed and in the loop on future use case projections is through participation in the ecosystem. For example, organizations like MassMEDIC and MeHI have working groups specifically focused on monitoring emerging technologies and what part it plays in the ecosystem. The Boston medtech ecosystem is collaborative by nature, through the facilitation work of innovation districts and their programming and forming relationships with stakeholders is vital to remaining informed.

Conclusion

The future of medtech in the Greater Boston innovation ecosystem is very promising, with multiple sectors poised to break into the healthcare industry over the next decade. There is no shortage of potential emerging from the area and as such, there is one major takeaway: Boston's clusters and the proximity to capital, academia, industry, and government support is cause for global draw to the city, especially with the increasing importance of interdisciplinary partnerships. With already established clusters, Boston has the ability to continue to revolutionize the medtech sector and Dutch innovators can look to Boston first when looking to the United States.

Appendix

Appendix I – Interviewees

Abigail Barrow, Founder and Managing Partner, Cambridge Innovation Partners

Abi Barrow has over thirty years of experience in the support of tech innovations and innovation ecosystems. She received both her bachelors of science degree in mechanical engineering and doctorate in economic development/technology transfer from the University of Edinburgh in Scotland. Currently, she is a founder and Managing Partner at Cambridge Innovation Partners (CIP), based in Kendall Square. CIP supports emerging technology companies through consulting and coaching in addition to stimulating the regional and academic ecosystems by building bridges between stakeholders.

Keely Benson, Director, Massachusetts eHealth Institute

Keely Benson is the Director of the Massachusetts eHealth Institute (MeHI) at the Massachusetts Technology Collaborative (MassTech). It is the designated state agency for promoting Health IT innovation, technology, and competitiveness to improve the safety, quality, and efficiency of health care across the Commonwealth of Massachusetts. Keely has worked for MassTech in various roles for over a decade and has over twenty years of experience in the healthcare field working in a variety of areas, including health information technology, interoperability projects to support clinical and public health use cases, digital health, and payer operations at the Executive Office of Health and Human Services (EOHHS). She holds a Master of Public Administration/Health Administration degree from Suffolk University in Boston.

Trevor Brown, Vice President, and General Manager Americas, LUMICKS

Trevor Brown is the Vice President and General Manager of LUMICKS in the Americas. LUMICKS is a Dutch biotech research company that provides single-molecule analysis technologies for cancer research immunotherapy. Based in Amsterdam, LUMICKS also has a location in Waltham where Trevor is based. Trevor received his Bachelor of Science in biochemistry and molecular biology from McMaster University and his Master of Science in cell biology from the University of Alberta.

Eric Evans, Executive Committee Member, Mass Medical Angels

Eric Evans is an active member of the early-stage investor community in Boston. He sits on the Executive Committee of Mass Medical Angels and as served as CEO for several biomedical companies, including Targeted Cell Therapies, Abazyme, Lumos Catheter Systems, Mulleris Therapeutics and Follica Biosciences. Mass Medical Angels is a venture capital firm based in Brookline, MA and seeks to invest in seed and early-stage life science and healthcare sectors in the areas of the medical device, therapeutic, diagnostic, health service, health information technology, research-related tool, and laboratory

equipment sectors. Eric holds a bachelor's degree in nuclear physics from Brown University and his master's degree in finance and public policy from the Wharton School at the University of Pennsylvania.

Katherine Green, Senior Program Manager, Massachusetts eHealth Institute Innovation

Katherine Green is the Senior Program Manager on the Healthcare Innovation Team at the Massachusetts eHealth Institute (MeHI) at the Massachusetts Technology Collaborative (MassTech). Katherine has worked for MeHI for 9 years and has prior experience in local government, notably as an elected Selectman in the Town of Acton. She received her Bachelor of Art in Political Science and Women's Studies from Wellesley College.

Richard Meiklejohn, Innovation Leader, Massachusetts Medical Device Development Center & Biotech Incubator

Richard Meiklejohn is the Innovation Leader at the Massachusetts Medical Device Development Center & Biotech Incubator (M2D2). Based at the University of Massachusetts Lowell, M2D2 is an incubator that supports the commercialization of medical device and biotech startups by providing a wet and dry labs, office and meeting space, and state-of-the-art equipment for medical device, medtech, and biotech startup companies to grow. Richard supports startups in developing their technology through the new M2D2 IMPACT Global Accelerator, a tailored program for medical device and biotech companies who are seeking to commercialize their IP. He received his bachelor's degree from the University of Dundee in Anatomical Sciences and his Master of Business Administration from Suffolk University.

Rachel Robinson, Chief Operating Officer, MassMEDIC

Rachel Robinson is the Chief Operating Officer of MassMEDIC. She is an accomplished marketing, strategy and business development executive who has spent her career exclusively in medical devices and robotics. She has been with MassMEDIC since 2020. Prior to her role as MassMEDIC, she served as the Director of New Product Development at Delve. She received her bachelor's degree in English Literature from Eastern University.

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