

## WISCONSIN BIOHEALTH TECH HUB DESIGNATION NARRATIVE

Wisconsin is at the forefront of personalized medicine: a revolutionary approach to healthcare using information from a patient's unique genetic code, medical record, and environment to guide decisions about tests, treatments, and therapies tailored for them. This approach can help patients have better health outcomes at lower costs, and puts people at the center of our nation's approach to **Key Technology Focus Area (KTFA) #7**.

Our researchers are developing new therapeutics in university and private-sector labs; technical teams are analyzing vast datasets in state-of-the-art data centers; manufacturing workers are assembling precision medical devices in production facilities; and providers are testing new treatments to help their patients in community hospitals. An EDA investment will build on our strong, unique cluster of scientific, manufacturing, data science, and health care delivery assets to form a Biohealth Tech Hub for personalized medicine. This Hub, centered in the **Madison MSA and Milwaukee–Waukesha MSA** with manufacturing “spokes” in the Fox Valley and around the state, will create good jobs for Wisconsinites of all backgrounds, deliver local economic growth, support Wisconsin manufacturers and strengthen supply chains, and ensure domestic control of critical genomic technology and domestic growth of biotech manufacturing.

### Technology-based potential of the region for global leadership

The personalized medicine market includes three verticals in which Wisconsin leads: imaging and theranostics<sup>1</sup>, genomics, and big data and analytics driven by artificial intelligence (AI) and machine learning (ML). Wisconsin has deep assets across these verticals and offers colocated advanced manufacturing to deliver personalized medicine at scale. That positions us well to capture market opportunity: Of the top 20 U.S. MSAs for scientific research, Madison is one of only six with competitive advantages in manufacturing.<sup>2</sup>

Today's \$220B market is expected to grow at 13% per year to nearly \$700B over the next decade.<sup>3</sup> Seizing this opportunity will create over 150,000 jobs within 10 years: close to 35,000 directly and an additional 120,000 indirectly, given the industry's exceptionally high employment multiplier of 3.7x.<sup>4</sup> These are good-paying, high-quality jobs across sectors, such as assembly technicians, lab technicians, specimen processors, and skilled trade jobs like machinists, welders, and tool and die makers. Over 65% of all of these new jobs will require less than a bachelor's degree. Biohealth sector wages are 70% above statewide average wages.<sup>5</sup>

Our region's world-class strength in the underlying science of personalized medicine includes:

- **Imaging and theranostics:** GE HealthCare is the U.S.'s only major medical diagnostic imaging and product manufacturer. Accuray is the only major U.S.-based manufacturer of radiation therapy systems. UW–Madison's clinical, research, and training programs in medical imaging and radiology are among the best in the nation.
- **Genomics:** Exact Sciences is one of the world's leading cancer diagnostics companies. Illumina commands an 80% share of the next-generation genomic sequencing market. Promega is a global leader in cell biology, nucleic acid analysis and molecular diagnostics. Wisconsin has a deep bench of research centers, such as UW's Collaborative Genomics Core.
- **Big data and analytics:** A unique mix of leading healthcare data firms and research institutes are Wisconsin-based. Companies such as Epic Systems, which makes software for hospitals that hold medical records for the majority of U.S. patients; advanced analytics firms such as Kairos Technologies; and academic institutes such as the Medical College of Wisconsin's Kern Institute Data Science Lab and Northwestern Mutual Data Science Institute in Milwaukee collectively provide a competitive advantage as healthcare-related AI/ML development accelerates worldwide.

Access to local advanced manufacturing turns these assets into highly specialized medical tools, tests and devices required for personalized medicine. Wisconsin's advanced manufacturing and

engineering facilities boast deep expertise in custom and precision manufacturing capabilities necessary to advance the field of personalized medicine. These include Fox Valley-based Plexus, GE HealthCare's (GEHC) largest supplier globally and representing suppliers in the consortium; and Milwaukee's Rockwell Automation, a leading global provider of industrial automation controls. A strong cadre of suppliers rounds out our ecosystem.

Wisconsin was highlighted by the Brookings Institute's 2019 article, "The Case for Growth Centers," which ranked Madison #1 and Milwaukee #17 across U.S. metropolitan areas as next potential U.S. tech hubs because of our innovation, R&D, and education levels.<sup>6</sup> Biohealth companies across the U.S. and the world are expanding in or relocating to Wisconsin for our skilled workforce, low-cost production environment, and innovation ecosystem.<sup>7</sup>

Personalized medicine brings together disparate technologies, practitioners and datasets in new ways. Its success depends on managing complex collaboration among players. The Hub will unite multiple companies, which form new care pathways and incubate new products, with researchers and providers who can prove those pathways' and products' clinical effectiveness. In personalized medicine especially, these forums for collaboration and shared product development spaces are what enable progress.

Our Tech Hub will accelerate and establish best practices for these collaborations via:

- **Strategic coordination.** The industry's current approach to technology development is uncoordinated and misses opportunities to advance new clinical care pathways, such as new ways to treat specific cancers. The Hub will sponsor a personalized medicine technology and product development strategy to develop these new pathways and improve patient care.
- **Data sharing:** Without access to robust, diverse, bias-free clinical data, personalized medicine can only effectively serve a small portion of the population. The Hub will build and use the data science and computing infrastructure to facilitate this data exchange, and ensure access and use of data from diverse populations.

### **Innovative lab-to-market approaches**

Wisconsin has long converted academic research into commercial success. UW–Madison's tech transfer model partners with a private entity to commercialize technology, allowing broader leeway to defend IP and to support startups without the limitations many universities face. That entity, the Wisconsin Alumni Research Foundation (WARF), holds over 2,230 active patents and IP leading to 190 startup companies. UW-Madison and WARF are providing seed funding for a Theranostics Center of Excellence to accelerate commercialization by translating preclinical discoveries into clinical practice. Madison's University Research Park now houses 125 companies and over 4,100 employees; Milwaukee research parks and accelerators such as the UW–Milwaukee Innovation Campus have grown over 100 startups. Venture funding to the region's biotech startups has increased, on average, 35% per year in the last five years<sup>8</sup>, and our research institutions have received numerous federal awards to advance personalized medicine.

This holistic support has produced a critical mass of companies poised for future growth. Additional lab-to-market assets in the region include:

- **Public Funding:** Wisconsin Economic Development Corporation has invested in early-stage companies through \$140M in investment tax credits, \$36M in debt financing, and \$12.6M in SBIR Matching Grant funds. Federally supported programs such as UW–Milwaukee's NSF I-Corps have catalyzed the formation of over 30 companies from multiple universities.
- **Incubators:** The Isthmus Project at UW–Madison, a technology incubator physically embedded at our hospital to catalyze clinical development, works to move theranostics ideas from researchers to providers. Forward BIOLABS has successfully attracted over \$290M in investment with 19 companies graduating into larger facilities throughout the region.

- **Education:** UW–Madison has (1) the nation’s largest graduate training program in medical physics, including an Entrepreneurial Fellow program designed to fast-track startup incubation and formation; and (2) a Master of Science in Biotechnology program, modeled as an example of academic-industrial collaboration for professionals (83% of its 500+ graduates have stayed in-state post-graduation); and (3) continuing education programs for engineers.

Our region is bursting at the seams with biohealth ventures in search of lab and computing space, a hurdle that limits their growth trajectories and limits job creation. Our Tech Hub intends to direct funding to address this constraint in the following ways:

- **New lab and computing space:** To add or convert space throughout the region, we will (1) explore new real estate opportunities via universities, developers, or municipal entities; (2) open new space on or near campus to foster entrepreneurship and corporate partnerships; and (3) offer grants or matching funds to companies that add to lab and computing space or convert office space to these uses. In addition, Forward BIOLABS will pursue expansion into Milwaukee as an innovation bridge between the two cities.
- **Policy change.** Our consortium will explore and recommend policy changes that further accelerate technology commercialization and will pursue those changes as part of an implementation grant proposal.

### Role of the private sector

Our consortium includes five global industry leaders in personalized medicine, each making significant commitments that align to our strategy. Highlights from their Letters of Commitment include: (1) GEHC will invest over \$100M in new West Milwaukee and Waukesha campuses to increase its manufacturing capacity, and spend \$1B with Wisconsin suppliers over the next five years; (2) Accuray will relocate its headquarters from Silicon Valley to the region to take advantage of our highly-skilled, lower-cost talent and co-located manufacturing; (3) Exact Sciences will explore expanding Registered Apprenticeships to train people from underrepresented groups; (4) Plexus will expand skills-based hiring and internships; and (5) Rockwell will share expertise on process automation systems and instrumentation to help align Wisconsin’s small manufacturers and strengthen our supply chain.

Wisconsin’s biohealth industry contributes \$32B to the state’s economy<sup>9</sup>. To expand this impact, our Tech Hub intends to direct funding to these initiatives:

- **Access to capital:** Wisconsin has a thriving startup ecosystem and is in the top 10 states for NIH SBIR awards per capita. However, we have only seen 2.5% of venture-capital funding in the U.S. for personalized medicine in the last five years. The Tech Hub will activate venture investment with (1) publicly matched funds, (2) increased corporate “build-to-buy” venture investments, (3) local “fund of funds” investments to increase local liquidity, and (4) a national marketing, relationship-building, and education effort to attract new capital.
- **Manufacturing and supplier support:** New biohealth manufacturers and suppliers, particularly minority and rural vendors, face stringent regulatory requirements, difficulty connecting with potential biohealth customers and a limited workforce familiar with ISO and GMP processes. Our consortium and hub will grow production ecosystems by (1) providing capital for equipment upgrades and automation to remain cost-competitive, (2) convening and connecting R&D companies with manufacturers, and (3) providing technical assistance including identifying technologies, skills and career pathways for advanced manufacturing.
- **“Good jobs” economy:** Employers will implement and expand practices to recruit, hire, develop and retain a skilled, diverse workforce in good jobs with benefits and upward mobility. This includes forecasting jobs, careers, targeted credentials and skills; implementing skill-based hiring and career advancement; offering strong pay, benefits, and

career pathways; and other principles and practices outlined in the Dept. of Commerce's workforce development agenda and the Dept. of Labor's Good Jobs Principles.

### **Regional collaboration and partnerships**

The 15 members of our consortium<sup>10</sup> balance the breadth required to succeed in this complex space with the focus required to be effective and nimble. We have a track record of successful collaboration. For example, GEHC has built a vital collaborative research and technology relationship with UW–Madison over the past 30 years that has generated many health innovations, including more than 100 patents.

Our lead applicant, BioForward, Inc., an industry group nonprofit founded in 1988 with offices in both Madison and Milwaukee, has long centralized access and coordinated diverse biohealth partners. BioForward leads collaboration to improve talent attraction and retention, STEM education, supplier diversity (including rural and minority suppliers), and industry sustainability. Our consortium, including BioForward, is launching the Wisconsin Biohealth Tech Hub and will fund and staff the hub regardless of whether the EDA provides a grant. The hub's inaugural Chair is [Aaron Olver](#)<sup>11</sup>, Wisconsin's former Secretary of Commerce. BioForward will employ the Regional Innovation Officer (RIO) and the hiring process is underway. Our letters of support detail the consortium's MOU and Hub governance plan and the commitments of consortium members to shape and support the hub and channel energies of even more Hub partners.

### **Composition and capacity of the regional workforce**

Currently, Wisconsin's biohealth sector employs nearly 52,000 people in the state and pays an average wage of approximately \$96,000, 70% higher than the state's private-sector average.<sup>12</sup> We aim to nearly double that sector employment within a decade. In addition to attracting new workers to the state and retaining those already here, we will deliberately build racial, gender, skill, and geographic diversity by preparing and matching local workers to good jobs to keep pace with a market expected to grow at 13% per year over the next decade.

We will ensure equitable career pathway access. Half of the counties in our two MSAs are rural; we will create on-ramps and pathways that meet the needs of these workers so they can contribute to and benefit from the Hub's growth. Just 16% of scientists in our two MSAs are people of color, compared to 35% of scientists nationally. The manufacturing sector offers above-average wages and opportunity for the more than 70% of our manufacturing workers with some college or less<sup>13</sup>; over 65% of the hub's 150,000 new jobs will not require a college degree. We will draw heavily on minority workers; currently, 25% of manufacturing workers in the combined MSAs are non-white, compared to a non-white population of 14% statewide.<sup>14</sup>

Fortunately, our region boasts a number of effective workforce programs, including:

- Employ Milwaukee's employer-led Manufacturing Industry Partnership fills good jobs in advanced manufacturing with workers from Milwaukee's marginalized communities through community engagement, industry-recognized training, and robust wraparound supports.
- UW-Milwaukee and Rockwell Automation have trained over 2000 students in advanced automation via the Connected Systems Institute (CSI).
- Plexus sponsors youth robotics events and connects high school girls in rural Neenah, WI to the Fox Cities science and technology community to encourage careers for women in STEM.

But even many successful programs lack coordination, full alignment to employer needs, and sufficient biohealth focus. Our workers need upskilling, reskilling, and experiential learning. To address this, we will direct implementation funding to employer-driven initiatives including: (1) Developing a **comprehensive, employer-driven regional workforce strategy** to grow and train Wisconsin's biohealth workforce according to employers' current and future projected needs; (2)



Centralizing sourcing and matchmaking via the Hub's new **Workforce Talent Connector** to power new or expanded biohealth and affiliated manufacturing training programs; (3) Expanding **Registered Apprenticeships**, on-the-job learning and **skills-based hiring and advancement**, aligned to **employer-verified credentials and skills**; (4) Producing and disseminating **projections of needed jobs, skills, careers and training**; as well as data on participating training programs' wage and employment outcomes; (5) Improving **wraparound services** to increase participation from vulnerable populations; and (6) Improving recruitment with better marketing of biohealth opportunities and career pathways.

## Equity and diversity

**Equitable planning:** Seven of our 15 consortium members have a primary focus on underserved communities via workforce training (our technical colleges, workforce development organization Employ Milwaukee, and labor-aligned workforce training intermediary WRTP Big Step) and community-led development (economic development organizations MadREP, M-7, WEDC). Our workforce strategy development engages underserved communities from all eight counties, five of which include communities under 150K; half of participants represent rural counties and entities that serve EDA's underrepresented populations.

**Equitable distribution of Hub benefits:** Our Hub's target underserved populations include our region's skilled workers without bachelor's degrees, racial and ethnic minorities, rural workers, rural and minority suppliers, renters, and vulnerable patient populations. In addition to **supplier support** and **equitable workforce programs** detailed above, our Hub's strategy also focuses on **renters** and **minority entrepreneurs**. The City of Madison letter details commitments to expand and support pro-housing policies to prevent displacement as our workforce grows. Exact Sciences and other consortium members are investing in local housing initiatives such as the Dane County Workforce Housing Fund. **Minority entrepreneurship** will be a major focus for the hub, building on WEDC investments in community-led entrepreneurial programming that support communities to develop their own initiatives and measure impact.

**Equitable patient outcomes:** The needs of underserved patient populations have historically been deprioritized in research and product development. The Hub will establish a **Patient Advisory Group** to offer feedback on which products to develop and where to invest in research – feedback that is often cost-prohibitive for companies and researchers. The group will help ensure that patient needs, especially those of vulnerable populations, guide the Hub's direction.

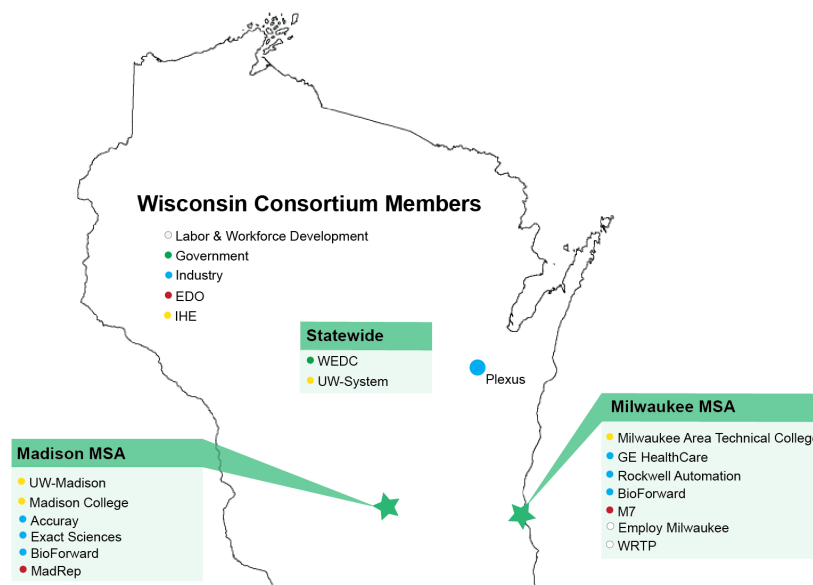
## National and Economic Security

**Economic security:** Our Hub's success will build strong, resilient Wisconsin-based supply chains and manufacturing capacity. We will build Wisconsin's advanced manufacturing sector, align advanced manufacturing practices that support the future of healthcare, attract and retain biohealth firms in Wisconsin, and help limit U.S. dependence on manufacturing outside the U.S.

**National security:** The United States' ability to develop, manufacture, and apply these technologies domestically is a critical national security priority; two recent Executive Orders emphasize strategic importance of genomic sequencing.<sup>15</sup> Expansive domestic sequencing capacity for accelerated vaccine production helped the U.S. emerge from the COVID pandemic. However, the United States is not alone in recognizing the potential of this technology; China is already investing billions. Chinese firms such as the Beijing Genomics Institute (BGI) have become major international providers of genomic sequencing equipment. The National Counterintelligence and Security Center (NCSC) has warned that dependence on China in this field is a growing national security risk<sup>16</sup> and a Congressional committee has proposed a federal procurement ban for BGI and its subsidiaries. Our Hub will accelerate domestic genomics technology development and manufacturing capabilities to ensure the U.S. and our allies can access needed products and services without relying on China.

## APPENDIX: WISCONSIN BIOHEALTH TECH HUB DESIGNATION NARRATIVE

- 1) Theranostics are therapies that also yield a diagnosis, such as specialized radioactive drugs that can both detect tumors on scans and kill cancer cells.
- 2) 2022 QCEW annual data. Analyzed location quotients for scientific research (NAICS: 5417) and manufacturing (aggregate industry code 1013).
- 3) Today's \$98B theranostics market is expected to grow ~11% per year to reach \$218B by 2033. The current genomics market exceeds \$87B, and is expected to grow ~9% per year to reach \$166B by 2033. Today's \$35B market for healthcare data and analytics, including AI and ML technologies, is expected to grow up to 21% per year to reach \$161B by 2033.
- 4) Blended employment multiplier based on Mass. and Calif. life science industry reports.
- 5) & 7) & 9) & 12) Teconomy Partners, "[Wisconsin Biohealth Industry Landscape and Economic Impact Report](#)", October 2022.
- 6) The Brookings Institution, "[The Case for Growth Centers: How to Spread Tech Innovation Across America](#)", Robert D. Atkinson, Mark Muro, Jacob Whiton, December 9, 2019.
- 8) America's Frontier Fund analysis, March 2023.
- 10) Wisconsin Biohealth Tech Hub Consortium members and their entity types:



- 11) [Aaron Olver LinkedIn Profile](https://www.linkedin.com/in/aaron-olver-a129155) (https://www.linkedin.com/in/aaron-olver-a129155)
- 13) Census LED data 2022 for QCEW annual data; statewide data used for industry-education breakdowns
- 14) Lightcast, 2023 data
- 15) [Executive Order on Advancing Biotechnology and Biomanufacturing Innovation for a Sustainable, Safe, and Secure American Bioeconomy](#) (2022) and [Executive Order on America's Supply Chains](#) (2021).
- 16) "[China's Collection of Genomic and Other Healthcare Data from America: Risks to Privacy and U.S. Economic and National Security](#)," The National Counterintelligence and Security Center (Feb. 2021)