Application for Buffalo-Rochester-Syracuse Regional Tech Hub: New York Semiconductor Manufacturing and Research Technology Innovation Corridor (NY SMART I-Corridor)

Overview.

The Buffalo-Rochester-Syracuse (BRS) corridor is singularly positioned to rapidly address vulnerabilities in US semiconductor manufacturing at the intersection of the high-performance computing and advanced manufacturing technology areas. The combined MSAs of Buffalo, Rochester, and Syracuse in upstate New York (along with Ithaca and the Auburn and Batavia MiSAs) has undergone a significant transformation in just twenty years, from persistent economic decline to a growing hub for tech talent development, new American migration, and entrepreneur activity, validated as the #1, #3, and #15-ranked metros in *Jump Starting America*'s Tech Hub Index System. Our consortium, comprised of leaders from across the public sector, industry, higher ed, economic and workforce development, and labor, will establish the **New York Semiconductor Manufacturing and Research Technology Innovation Corridor (NY SMART I-Corridor).** NY SMART I-Corridor will build upon our manufacturing strength to become a global leader in semiconductor manufacturing – with a focus on creating economic opportunity for underserved communities, enabling outsized benefits given the growth opportunity and strong regional/national momentum behind semiconductor manufacturing.

1. Technology-based potential of the region for global competitiveness.

NY SMART I-Corridor will be a globally recognized semiconductor manufacturing hub in the next decade, with innovation focused on improving the quality and quantity of semiconductor manufacturing and, along with it, amplifying the region's microelectronics ecosystem. We will build off a rich inventory of assets across the entire semiconductor manufacturing value chain as well as an undeniable momentum that includes:

- **A growing semiconductor manufacturing base with over $100B in planned fab investments.** Regional fabs such as NexGen Power Systems and Akoustis Technologies currently represent ~1.3% of national fab capacity.[1] In 20 years, the corridor will see $100B in planned front-end DRAM fab investments by Micron in Syracuse, and benefit from investment across in the broader region[2] as well as state initiatives to incent sustainable semiconductor manufacturing.[3]

- **Over 100 supply chain providers in the semiconductor or adjacent industries.** Assets supplying the semiconductor industry include Edwards, Corning, Optimax, INFICON, Sydor, Linde, IDEX, Materion, D3 Engineering, AIM Photonics' Test, Assembly and Packaging (TAP) Facility, and more. The corridor's strength in optics has propelled regional firms to be critical component suppliers for the tooling and equipment used globally in semiconductor manufacturing. Ongoing industry 4.0 advancement, including in optics and sensing, will transition existing companies to plug into the semiconductor supply chain and microelectronics ecosystem, supporting supply chain resilience.[4] This momentum, combined with placemaking and navigation support for global firms, will provide a soft landing for foreign direct investment and reshoring, attracting more assets to the corridor.

- **A concentration of world-leading scientific capabilities – in sensing, supply chain, and green tech – that position our corridor as the "go-to" location for innovation in semiconductor chip design, manufacturing, and testing.** In aggregate, the Buffalo-Rochester-Syracuse region ranks in the top-25 MSAs nationally for patents related to high-performance computing (USPTO PatentsView), and in no other MSA is expertise of sensing technology so leveraged. We rank #1 in the US for patents per capita in optics, photonics, imaging – all critical for advanced sensing applications that power industrial automation driving improved semiconductor manufacturing; and over 150 optics / sensing-related companies exist in the Rochester area alone. **The region is poised to become a leader in making semiconductor manufacturing and the supply chain more sustainable**, with on-going R&D of environmentally friendly alternatives to inputs of semiconductor manufacturing and enabling tech in water resource science and green construction. The corridor is in upstate NY where 90% of energy

production is zero emission and clean energy supply is ample, including low-cost hydropower, which can be leveraged for energy-intensive semiconductor manufacturing.

NY SMART I-Corridor benefits from world-leading assets from across the broader state ecosystem. NYS is home to the most advanced publicly owned semiconductor R&D facility in the US, the Albany Nanotech Complex, and Cornell's SUPREME Center is accelerating development of energy-efficient semiconductor technologies. NY SMART I-Corridor will also coordinate with NSTC, NAPMP, and DoD ME Common programs to be proposed by NY CREATES and other NYS & regional partners. This could include Education & Workforce Development and semiconductor technology R&D programs.

NY SMART I-Corridor will amplify the impact of federal/state awards and programs – including Buffalo's Build Back Better award for advanced manufacturing; the University of Rochester's NSF Regional Innovation Engine award; and NYS's first-in-the-nation "Green Chips" program.

By 2033, NY SMART I-Corridor will account for 5-7% of national fab output (~$9.5B-$13B, or ~0.75%-1% of global output). Scale-up of local semiconductor supply chain and support services could account for an additional ~$850M-$1.2B in the same period. Upwards of 25,000 new jobs are expected, over half of which may not require four-year college degrees. About 4,500 jobs will be fab operator and technician jobs with average earning potential of $60K-$100K.[5]

2. Role of the private sector.

NY SMART I-Corridor is supported by extensive private sector sponsorship, with 22 private-sector institutions from across the *entire* semiconductor manufacturing value chain, evidencing the robustness of industry commitment.

- **In the core tech areas, industry leaders including Micron, Corning, and Linde are consortium members** that manufacture semiconductors or supply key inputs to the semiconductor value chain.
- **Critical suppliers of key semiconductor manufacturing inputs are well established.** Several have R&D innovation directly at the intersection of sensing and semiconductor manufacturing, as well as enabling technologies for high efficiency computing.
- **Private sector firms have made extensive investments and commitments**, incl. $100B from Micron, >$400M from supply chain firms[6], >$50M in next-gen tech by AMD; and $250M in the Green CHIPS Community Investment Fund, in partnership between NYS ($100M) and local partners ($150M).
- **The corridor hosts robust industry assets along the extended semiconductor and micro-electronics value chain.** This includes a defense cluster – heavily reliant on semiconductors – with ~$2B in defense contracts awarded in the last year, and AIM Photonics, one of nine manufacturing innovation institutes established by the US Dept. of Defense to invest in critical technologies.
- **The corridor's private capital has increasingly supported the needs of private sector firms to accelerate innovation.** From 2017-2022, the region's venture funding increased at 18% CAGR, totaling >$1.8B (Pitchbook), with firms supporting companies in startup, growth, and mature stages.

Additionally, we are working with our small- and medium-sized enterprises to build scale and adoption of automation technology as part of the semiconductor value chain. For example, **Buffalo Manufacturing Works' Shift program** currently engages >200 small manufacturing businesses and is assessing the transition of existing manufacturing to semiconductor-related products (including regional expansion through Manufacturing Extension Partnerships and certification mapping).

3. Regional coordination & partnerships.

NY SMART I-Corridor represents the continued evolution of decades of successful collaboration across the Buffalo-Rochester-Syracuse region, highlighted by strong and enduring partnerships among the corridor's research universities and joint business attraction activities.[7] Its three city centers are all located within a 2.5-hour drive, and economic connectivity is exemplified by an array of major businesses[8] with footprints spanning the region, as well as a shared labor pool in which 60,000-70,000

residents live in one MSA but work in another. Per EDA's US Cluster Mapping project, the three MSAs show an 80% cluster overlap, indicative of strong economic ties, with emerging specialization in IT and Analytics[9] (inclusive of semiconductor manufacturing). Examples of coordination include:

- **An entrepreneurship and innovation ecosystem** that supports tech growth and commercialization across and in coordination with the entire corridor.[10]
- **An existing coalition of Vice Presidents of Research,** across 8 universities including the University at Buffalo (UB), University of Rochester (UoR), Rochester Institute of Technology (RIT), Syracuse University (SU), as well as the broader region including Cornell University.
- **The Future Ready Workforce Innovation Consortium (FRWIC)[11],** with 40+ workforce dev. orgs., is scaling its semiconductor programming in collaboration with SU, UB, UoR, and community colleges.

This application is the result of a focused two-year effort to convene leaders in higher education, economic and workforce development, industry, government, and equity work. This consortium has been led by three designated conveners, one from each MSA: The John R. Oishei Foundation in Buffalo, ROC2025 in Rochester, and CenterState CEO in Syracuse. In 2021-22, in anticipation of EDA's Tech Hub opportunity, the three organizations convened leadership summits to deepen collective awareness of complementary assets, with 100+ stakeholders committing their support for a consortium application.

A regional coalition is required to deliver on goals and enable far-reaching impact. Following designation, the consortium will formalize the role of a **Regional Innovation Officer**, co-selected through a joint interview process, led by the three designated conveners. The coalition will be governed by an advisory council providing cross-regional leadership representation. The advisory council will also include participation from Empire State Development, NYS's primary economic development agency, who will assist with cross-regional coordination and integrating these efforts into the statewide semiconductor strategy. The consortium includes representatives from organizations leading racial equity programs to ensure diverse engagement and equity remain at the forefront of consortium efforts.

4. Equity & diversity.

NY SMART I-Corridor will activate unparalleled opportunity for equitable growth, which the consortium commits to delivering as it becomes a global leader in semiconductor manufacturing. The need in our region is substantial: Black and minority residents face greater unemployment than white residents; Buffalo and Rochester are plagued by 33% poverty rates; and Syracuse has the second highest percentage of families in the US living on <$10,000 a year.[12] With demand of upwards of 25,000 new or additional jobs in the next decade, over 50% of which do not require a 4-year college degree, there are unprecedented opportunities to:

- **Pursue overarching racial equity efforts that have demonstrated success**. Successful examples include programs deployed by the Greater Buffalo Racial Equity Roundtable, the Rochester Anti-Poverty Coalition, and CenterState CEO's Racial Equity and Social Impact and Inclusive Growth initiatives. These efforts advance policies, practices, and programs, such as the Racial Equity Roundtable's MWBE-led business procurement program, using community-informed processes, to address systemic racism holding back the advancement of BIPOC communities.
- **Engage underserved populations via workforce talent pipelines.** Each MSA has developed successful programs to support moving historically under-represented groups into high-demand skills and jobs. Examples of programs with proven impact include:
  - **Northland Workforce Training Center[13]** in Buffalo (876 students, 62% people of color, 87% placement)
  - **Monroe Community College** in Rochester (with nation's only Associate's degree in precision optics; 1/3 students of from underserved communities, placement rate of 100%)
  - **Work Train[14]** in Syracuse (served 1,300 job seekers, majority people of color)
  - Our extensive assets that engage underserved communities include: Say Yes Buffalo and Syracuse, Tech Buffalo, EWI, Rochester-Monroe Anti-Poverty Initiative, Transfr VR, Greater Rochester

Enterprise's Economic Gardening, Syracuse Surge Workforce, UB Center for Industrial Effectiveness, Finger Lakes Workforce Development Center, and more.

- **Ensure equity and diversification in entrepreneurship:** Minorities and women are under-represented in tech start-ups. Several scalable regional programs remove barriers with marked success – e.g., UB's Innovation Hub cultivator program (75% diverse founders), Surge Accelerator, Buffalo Niagara Partnership's Minority Business Initiative, Launch NY, 43 North's business plan competition.

We will embed equity in all aspects of implementation including how it defines success. This application includes letters of support from 4 entities representing underserved communities.

5. <u>Composition and capacity of the regional workforce.</u>

NY SMART I-Corridor has strength, competitiveness, and scalability in its regional workforce to become a global leader in semiconductor manufacturing, especially as talent needs evolve toward a rising demand for production engineering**.** The region's existing workforce with the skillsets needed totals 136K workers – including 43K technicians, 20K engineers, 7K quality assurance, 50K managerial, and 16K administrative roles, who are already employed across various industries. The region produces over 13K STEM degrees annually, with a bachelor's retention rate of ~60%, and is the national center for optics, with >60% of optics degrees in the US conferred here. With 11 higher education and 8 workforce development member organizations, the consortium employs a two-pronged approach to inclusive workforce strategy:

- **Growing the number, diversity and retention of STEM graduates.** Regional universities are expanding their STEM and semiconductor programs across all MSAs. This includes semiconductor-specific expansion plans at Syracuse, UB, UoR, RIT, and community colleges. Coordinated programming is expanding across the corridor, e.g., through DOD Microelectronics Commons Hub application, UPWARDS coalition of universities. Moreover, these institutions have worked to diversify their student base, including growing and retaining international talent (27,000+ across BRS).[15]

- **Building new pathways and pipelines for technical, non-college graduates.** With >50% of expected job openings not requiring four-year degrees, this presents an opportunity to engage a large labor pool by scaling successful workforce development programs (see Sections 3 & 4), as well as:
  - o **Future Ready Workforce Innovation Consortium**, focused on rural and urban New Yorker populations, diversifying and growing the semiconductor manufacturing workforce.
  - o Other assets include: Micron's apprenticeship for semiconductor technicians, Mechatronics training, Institute for Veterans and Military Families at SU, P-TECH programs, NY CREATES Vet S.T.E.P., and workforce practitioner programs (e.g., SUNY Oswego Instructor Bootcamp).

Nine labor unions are already engaged with the Pathways to Apprenticeship program (with 93% of graduates that are people of color and 23% of which are women) to secure a diverse construction workforce to build Micron's semiconductor fabs. Future efforts will scale labor-led workforce training programs like Training Rochester Adults in Construction Skills program, the Young Adults Manufacturer Training & Education Program, and Syracuse Builds, which has a 90%+ job placement rate. With such union engagement, the corridor offers the stability of an extensive, well-trained workforce.

6. <u>Innovative "lab to market" approaches.</u>

Leveraging a strong commercialization track record, we will establish the "R&D-to-market" playbook to innovate across the semiconductor manufacturing value chain. This includes applying existing innovative approaches and tech transfer models (e.g., EDI, Luminate, Rev Accelerator):

- **Adopt venture studio development model that entails proven[16], scalable approaches for tech commercialization, in partnership with universities**, targeting three barriers: technology pipeline; business team with commercialization expertise; and access to early-stage and high-risk funding.

- **Employ actionable, scalable models for tech transfer**, such as express licensing agreements for intellectual property, supporting semiconductor and the broader microelectronics industry.

- **Target hardware-specific startups and tailor interventions to address their unique barriers to commercialization,** as exemplified by Luminate in Rochester, the world's largest accelerator for startups delivering photonics and imaging-enabled technologies and partner to Silicon Catalyst, the world's only incubator focused on accelerating semiconductor solutions.

These models leverage a strong regional network of incubation and venture assets, including, e.g., Launch NY (a national top 5 seed-fund non-profit), The Tech Garden, NextCorps, 43North, Armory Square Ventures, Upstate Venture Connect, and StartFast Ventures. These assets, plus federal funding (e.g., NSF Regional Innovation Engines, Build Back Better), incent IP creation as federally funded inventions under the 1980 Bayh Dole Act. Beyond universities and industry, 4 venture firms are part of the consortium.

7. <u>Impact on economic and national security of the entire United States.</u>

The US produces less than 15% of global semiconductor output but accounts for ~35% of global demand[17], exposing it to significant supply chain, geopolitical, and other risks. Establishing strong domestic semiconductor manufacturing capacity, alongside scaling of supply chain, talent, memory architecture, and the advanced computing required, is key to national and economic security.

NY SMART I-Corridor will directly enhance the quantity and quality of US semiconductor manufacturing, benefiting the broader microelectronics ecosystem while creating high-quality American jobs that enhance national security through:

- **Innovation that enables domestic semiconductor manufacturing scale and productivity.** No other region in the US so readily fosters innovation at the nexus of manufacturing and sensing, enabling advances in manufacturing productivity that can be scaled. For domestic semiconductor manufacturing to be globally competitive (in cost, or otherwise), the US must lead in productivity.
- **Domestic suppliers to shore up national supply chain resilience** through: (1) attracting suppliers to open new facilities; (2) repurposing the region's deep industrial base to plug into the semiconductor supplier base; and (3) scaling existing regional suppliers.
- **Home-grown talent to meet the talent gap.** Workforce development programs will be scaled to fully meet the need for technicians, engineers, and craft laborers not just across the region but nationwide, with models created here that can be replicated across the nation.

The region benefits from an abundance of resources (e.g., water, clean energy) with low risk for natural disasters that can disrupt national security. By locating these efforts physically in the corridor, business continuity will be optimized while reducing risk for interruption. In addition, **NY SMART I-Corridor will be positioned to strengthen broader national security goals.** The region's robust set of defense and advanced industry leaders is well positioned to collaborate and innovate on critical defense and broader microelectronic applications in sensing, automation, and precision manufacturing. In the same way that US semiconductor manufacturing is only viable with best-in-class productivity, the defense industry – and specifically the defense cluster in our corridor – can be enabled by the same smart sensing and automation tech, fortifying the nation's ability to maintain its global leadership in defense.

8. <u>Summary of go-forward initiatives.</u>

The coordination and scale enabled by Tech Hub designation will amplify the innovation, supply chain, and equitable workforce expansion needed to become a global leader. Initiatives will focus on (1) innovation collaboration across the region's universities and private sector, as well as a common set of practices for sharing IP, facilities, faculty, and talent; (2) regional talent coordination, focused on equitable career exploration and upskilling through demand-driven skills-based certifications and training; (3) supply chain diversification and expansion including technical assistance, working capital access, integration with the semiconductor and microelectronics industry, as well as attraction of suppliers looking to open new offices; (4) private capital access as part of a 'venture studio', including seed and growth funding; and (5) physical innovation spaces, e.g., a 'smart sensing sandbox and automation test center' as a proving ground for manufacturing innovation.