Industrial Base Hackathon III – Western New York Results Report

Event: Industrial Base Hackathon III · April 30, 2026 · NYPA Niagara Power Vista · A series by Ad Astra Group

Media: www.industrialbasehackathons.com/results

Research, Analysis & Report by: Ad Astra Group

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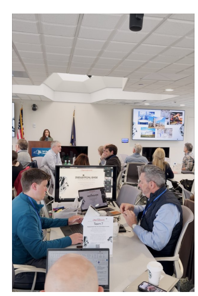
About Springboard

Springboard NY is an entrepreneurial ecosystem accelerator connecting and strengthening the organizations that help founders start and scale innovative businesses across Western New York. A collaboration of the Ralph C. Wilson, Jr. Foundation, the Center for Regional Strategies, Main Light Strategies, Victor & Company, and other community partners, Springboard works across nine counties spanning Greater Buffalo, Greater Rochester, and the Southern Tier. Its goal is to create a region with “no wrong doors,” where entrepreneurs can find the resources, relationships, and support they need to grow.

Springboard focuses on strengthening the organizations that support founders, helping them connect with one another, access funding and data, and better tell the story of what is being built across the region. Each year, its prize competition distributes hundreds of thousands of dollars to organizations, educational institutions, capital providers, and innovative businesses working to strengthen Western New York's entrepreneurial ecosystem. Its work also includes the Kauffman Fellows scholarship and a regional speaker series.

By sponsoring Industrial Base Hackathon III, Springboard is extending that work into Western New York's and the country's industrial base, bringing together the people and organizations needed to identify constraints, connect resources, and strengthen our capacity to build. Ad Astra Group is grateful to Springboard and our fellow co-hosts, Jack Greco, the New American Industrial Alliance (NAIA), and the New York Power Authority (NYPA) for making this working session possible, with special thanks to the New York Power Authority for hosting us onsite.

Industrial Base Hackathon III at the NYPA Niagara Power Vista, April 30, 2026.

PART 01

SUMMARY

Industrial Base Hackathon III was the third working session in Ad Astra Group's national industrial base hackathon series, following sessions in Austin and Los Angeles. The series is designed to surface the most consequential chokepoints across the industrial base: the single points of failure with the greatest downstream impact that recur across regions, sectors, and domains, and to design solutions that industry, capital, and government can act on to collapse timelines and accelerate the rebuilding of America's industrial base.

The scope spans startups, established businesses, procurement, regulation, policy, capital, workforce, infrastructure, and other constraints across critical industries including energy, defense, food, healthcare, and information and communications technology. The room reflected the industrial base end to end: manufacturers and machine-shop owners, power-authority siting and procurement leads, university researchers and center directors, a national-laboratory technologist, workforce and economic-development leaders, venture and impact investors, startup founders, state and consular trade officials, and the operators of the region's incubators, accelerators, and manufacturing alliances.

Each hackathon has two parts. Each working session is designed by Ad Astra Group as a research instrument: defining the problem architecture, questions, and structuring the tables, phases, and participant mix to surface the ground truth in the room and synthesize it into the research that follows. The first part happens in the room, where the operators closest to the problems surface the chokepoints, the ground truth behind them, and the first ideas for attacking them. The second is Ad Astra Group's research and synthesis: tracing what sits upstream of those problems, stress-testing the claims against primary sources, comparing them with patterns from other regions, and adding the data, mechanics, and intervention pathways required to make the solutions actionable.

The room knows the problems firsthand. The research works out what they are symptoms of. This report contains both.

WHAT WE FOUND

Western New York gave us an empirical window into a structural problem across the American industrial base.

Eight teams worked independently across workforce, supply chains, permitting, grid infrastructure, cross-border trade, capital, industrial capability, and agriculture. Despite approaching different problems, they repeatedly converged on the same upstream constraint: the systems that need to coordinate do not share a common language or ground truth.

Ad Astra Group's post-hackathon analysis traced these seemingly disparate bottlenecks upstream to the translation failures underlying them. The result is fragmented visibility into demand, capability, capital, workforce, policy, and risk. The infrastructure Ad Astra Group had already been building, and expanded for this analysis, demonstrates what becomes possible when those systems are connected:

translation → shared language → visibility → coordination.

What Each Team Focused On

TEAM 1

Aligning Talent Pipelines, Skills, and Training Programs Between Academia, Workforce, and Employers

Aligning talent pipelines, skills, and training programs between academia, workforce, and employers across borders.

This team will design scalable Canada-US workforce plans specifically for industrial manufacturers and startups.

TEAM 2

Real-time Supply Chain Visibility for Critical Component Delays and Unlocking Latent Manufacturing Capacity

Design coordination infrastructure or a framework that gives manufacturers real-time visibility across their supplier network so a single delayed critical component does not halt entire production lines.

The focus is on surfacing lead-time risk early enough to trigger alternatives.

TEAM 3

Cross-sector Compliance, Regulatory, and Permitting Bottlenecks for Manufacturing, Defense, and Energy

Identify the regulatory, permitting, and compliance frictions that consistently delay or block deployment of manufacturing, defense, and energy infrastructure: from NEPA (National Environmental Policy Act) reviews and environmental permits to CMMC (Cybersecurity Maturity Model Certification) mandates, ITAR/EAR (International Traffic in Arms Regulations / Export Administration Regulations) controls, and state-federal jurisdictional conflicts.

Map where these hurdles compound across industries, why they exist, and how they can be collapsed.

TEAM 4

Accelerating Grid Modernization and Transmission Buildout

Identify and prototype solutions to the operational, workforce, and regulatory bottlenecks slowing transmission expansion and grid modernization.

The team will focus on interconnection queue delays, grid flexibility constraints, and the gap between pilot and enterprise-scale deployment.

TEAM 5

Cross-border US-Canada Supply Chain Coordination for Industrials

Build a visibility and coordination layer for US-Canada industrial supply chains, addressing perceived "border thickening," lack of supplier awareness, and cross-border information asymmetry that prevents the Great Lakes/Upstate NY region from accessing Canadian suppliers and vice versa.

The team will target semiconductor, energy, and advanced manufacturing supply chains as the primary use case.

TEAM 6

Closing the Early-stage Deep-tech Commercialization Financing Gap

Catalytic and early-stage capital is consistently unavailable or misaligned for hard-tech startups trying to bridge from prototype to first revenue, leaving promising industrial technologies stranded.

This team will design mechanisms or matchmaking frameworks to connect pre-seed deep-tech ventures with patient, catalytic capital sources in the Great Lakes/Upstate NY region.

TEAM 7

Mapping Western New York's Industrial Base Ecosystem

Build a working visualization of WNY's industrial capacity: the manufacturers, suppliers, energy assets, workforce pipelines, and research institutions that constitute the region's productive base.

Identify where capabilities cluster (advanced manufacturing along the I-90 corridor, hydroelectric power at Niagara, materials and aerospace legacy from Bethlehem/Bell), where the gaps are, and how these assets connect (or fail to connect) to national defense, energy, and reindustrialization demand signals.

TEAM 8

Agriculture and Food Production Resilience

Examine the structural vulnerabilities in domestic food and agriculture systems, from input dependencies (fertilizer, seed genetics, agrochemicals) to processing consolidation, cold chain logistics, labor shortages, and biosecurity risks.

Identify where WNY and the broader Great Lakes region's agricultural base intersects with national food security, where single points of failure exist (e.g., concentrated meat processing, import-dependent specialty inputs), and where reindustrialization of ag-tech and food manufacturing could close strategic gaps.

> **Main downstream bottlenecks and problems clustered around** data and visibility gaps, workforce shortages, regulatory and permitting friction, supply-chain and manufacturing constraints, capital mismatches, and infrastructure capacity limits.

Cross-Cutting Structural Issues

Across the tables, the same structural failures appeared in different forms.

- **Data, visibility, and information architecture.** Incomplete or incompatible data on lead times, capabilities, status, origins, and demand cascades into bad decisions upstream and downstream. NAICS (North American Industry Classification System) codes alone do not describe what many manufacturers actually make. There is no shared, usable view of capability, capacity, or status across firms, agencies, and borders. Tariff classifications, engineering standards, freight status, permitting records, and workforce data each live in different systems with different definitions and levels of access.
- **Workforce and knowledge transfer.** Skilled-trades shortages are acute, but the constraint is deeper than headcount. The workforce is aging, journeymen cannot be produced quickly, training programs often do not align with employer demand, and knowledge is leaving faster than systems exist to receive it. Students, parents, and counselors still have limited visibility into modern industrial careers.
- **Regulatory, permitting, and political uncertainty.** Projects are slowed not only by the duration of review but by uncertainty about who owns the process, what standard applies, and whether the rules will remain stable. State and federal requirements duplicate one another, political cycles reverse prior decisions, and process-heavy rules can block infrastructure even when the underlying technology exists.
- **Capital and time-horizon mismatch.** Long-cycle deep tech, agriculture, manufacturing, and infrastructure require patient capital, while most private and public funding structures operate on shorter horizons. Government funding is fragmented across levels and programs; venture capital is geographically concentrated; and participants repeatedly contrasted America's fragmented capital stack with systems able to coordinate around longer-term industrial goals.

- **Misaligned incentives.** Knowledge holders, manufacturers, training providers, regulators, capital providers, and economic-development organizations are often rewarded for optimizing their own piece rather than the system. The result is information withholding, duplicated infrastructure, weak handoffs, and coordination that depends on individual relationships rather than shared systems.

Recurring Systemic Diagnosis

Participants repeatedly returned to the same point: programs exist. What is missing is the visibility and coordination that allow the programs, capital, facilities, workforce, and policy to find one another.

Sector-specific interventions will continue to underperform when the underlying demand, capability, status, and constraints cannot be seen from a common ground truth. Journeyman-level capability cannot be created overnight. Permitting certainty cannot be produced by another disconnected dashboard. Industrial capacity cannot be mobilized if buyers cannot find it.

The problem is not a shortage of activity or resources. It is the absence of infrastructure that makes the activity legible and coordinated.

The Day in Concepts and Phrases

THE CONVERGENCE, IN THE ROOM'S OWN WORDS

five themes reached independently by eight tables with no cross-talk until report-outs

CONVERGED THEMES 1 & 2

NOBODY CAN SEE DEMAND, CAPABILITY, OR STATUS

a wrong fiber guess (512 vs 1024 count) is a catastrophic forecasting miss (a fiber producer)

3,000-6,000 manufacturers, **~95%** small, invisible to buyers and talent alike

"I keep seeing this one map and I keep saying I'm not on it. How do I get on it?"

"here's all the folks that make O rings. Right now you're buying O rings from South Korea"

cross-border delays are unpredictable: no real-time status for goods held at the border

CONVERGED THEME 3

NOBODY OWNS THE DATA: THE TRUSTED NEUTRAL STEWARD

"who's going to own this stuff? That's the next question." (report-out)

universities named most often as hosts

"a red, green, yellow light system": share status, not secrets

bill of materials through the tool as buy-in

CONVERGED THEME 4

WORKFORCE = KNOWLEDGE TRANSFER, NOT HEADCOUNT

"how do you train 10,000 people when they don't know they have a job?"

journeyman cliff: "ratio of apprentices you can supervise with journeymen"

"job security when you know how to do everything"

"we're not trying to save everyone. We're trying to save someone."

CONVERGED THEME 5

REGULATORY, PERMITTING, AND POLITICAL UNCERTAINTY

"wicked gate keys": a $200 part, $5,000, months

"still be reviewing if the power plant fell into the gorge"

"a wetlands is a wetlands, whether it's at the federal or at the state level"

"delay is enough to win"

administration and policy whiplash: rules and approved-vendor lists reset with each administration

the poll: zero hands for "technological"

Solutions

The teams designed solutions to the downstream bottlenecks they encountered. Viewed together, several of the highest-leverage proposals are versions of the same build: translation infrastructure plus a trusted steward of the shared ground truth.

Team 3 proposed shared regulatory determinations and a public siting-and-demand data store. Team 5 proposed standards crosswalks and coordinated visibility between the US and Canadian customs systems. Team 7 proposed an entity-level capability data layer. Team 2 proposed the translation layer required to make proprietary shop-floor data interoperable.

Different domains needing the same architecture.

Team 1 · Aligning Talent Pipelines, Skills, and Training Programs Between Academia, Workforce, and Employers

- Build a pipeline of people to transfer knowledge to.
- Identify companies that want to hire and get them to recognize they must invest in people.
- Begin exposure at the primary-school level.
- Start robotics programs at Grade 7 to introduce students early.
- At high-school level: organize shop tours, career fairs, connect company HR to school counselors, expand co-op programs.
- Connect companies directly with educators so students see skilled trades hands-on.
- Expose students and parents to modern career opportunities in the trades (counter the stigma that trades are dirty, noisy, or for people who are not smart; emphasize that they are clean and smart).
- Show the full range of roles inside manufacturing plants (purchasing, bookkeeping, HR, etc.), not only the shop floor.
- Use financial incentives modeled on Canadian examples: funds and co-ops that help cover training costs and offset lost production; even small amounts (example given: $6K) cause employers to invest matching amounts.
- Key owners of the solution: companies, training centers, high schools, and workforce development organizations.
- Align the three critical actors: employers, job-training infrastructure (vocational or academic), and the P-12 education system.
- Shift workforce incentives away from short-term job volume toward long-term, high-quality careers.
- Build on the Industry Forward program: it already places 165 paid internships and 150 workers, operates 5 centers, places over 1,000 jobs per year, maintains a collective database of Department of Labor-level data, and meets every two weeks. The missing piece is more systematic conversations so existing infrastructure is fully used. When university, industry, and the system align, placement works.
- Hire young people in peer cohorts; retention comes through belonging ("surround them with other thems").
- Focus on producing more journeymen (5–10–15 years of experience); apprenticeships can be made easier, but there is no shortcut to journeyman-level capability.

Team 2 · Real-time Supply Chain Visibility for Critical Component Delays and Unlocking Latent Manufacturing Capacity

- Implement automated data collection systems (advanced manufacturing already generates data, but the infrastructure to collect and analyze it is costly).
- Use "sticks": primes can require specific software; banks can require software as a condition of financing.
- Use "carrots": grant funds to offset the cost of data systems.
- Combine carrots and sticks.
- Support primes in gaining deeper visibility into data further down their supply chains.
- Demonstrate ROI of better data at the company level and for investors, insurers, and governments; identify who can facilitate development of the needed systems.
- Organizations named as helpers: MEPs (Manufacturing Extension Partnerships), economic development groups (federal, state, and local), and lobbyists. Universities and capital providers were noted as currently missing and needed.

Team 3 · Cross-sector Compliance, Regulatory, and Permitting Bottlenecks for Manufacturing, Defense, and Energy

- Issue an executive order requiring a lead agency to be appointed within 90 days for each project (addresses the problem of unclear agency ownership, including under federal agreements).
- Establish state-federal permitting agreements as a distinct instrument: one dataset or one permit satisfying both jurisdictions (agreements of this kind already exist in some states and are very concrete).
- Build a comprehensive GIS database covering siting considerations (wetlands and other site characteristics), plus demand information (who is building what and how much capacity is needed). Host at the state level (possible hosts named: Economic Development, DEC (Department of Environmental Conservation), NYSERDA (New York State Energy Research and Development Authority), Department of State). Make a public version available; much of the data is already FOIA-able (obtainable under the Freedom of Information Act).
- Create a repository of permitting and siting best practices so successful approaches can be replicated; include a peer-learning or seminar component (academia and the state could support this).
- Build a public dashboard or tracker showing how long projects take to move through permitting, creating accountability. Suggested home: Governor's office. Developers and trade organizations should push for it.
- Develop shared informational infrastructure / a common database so the same regulatory concept (example given: "a wetlands is a wetlands") is defined consistently at state and federal levels.

Team 4 · Accelerating Grid Modernization and Transmission Buildout

- Shift regulation from process-focused rules to outcome-focused rules (examples given: reliability outcomes, emissions limits, downtime targets) so utilities and businesses can decide how to meet the outcomes.
- Have policymakers from local to national levels review the full regulatory stack and trim unnecessary process requirements.

- Move toward a deregulated power market structure similar to Texas, applied nationwide.
- Lower barriers of entry for smaller innovative companies so they can open faster lines and expand the supplier base for power equipment.
- Regulatory bodies explicitly referenced for engagement: NERC (North American Electric Reliability Corporation), FERC (Federal Energy Regulatory Commission), CIP-13 (cybersecurity), quality assurance, legal, ISO (independent system operator), and NYPA (which already works with power plants).

Team 5 · Cross-border US-Canada Supply Chain Coordination for Industrials

- Provide more federal-level direction to help companies navigate tariffs.
- Increase access to and visibility of existing tariff resources and navigation tools (currently not widely known or seen).
- Improve codes and guidance for tariffs.
- Create better visibility into the status of goods held at the border, including the reason for the hold (current notices only state that an item is on hold).
- Develop clear direction and crosswalks for US-to-Canada codes covering engineering, design, and other requirements so companies are not discouraged from cross-border work.
- Improve information and visibility for navigating provincial barriers within Canada (noted as sometimes harder than Canada-to-US).
- Address shortage of transportation (especially truck drivers) on both sides of the border.
- Build an alternative transportation ecosystem for industrial goods that cannot move easily by rail or for which barge is slow and costly.
- Develop the full ecosystem needed to enable reliable industrial transportation.
- Create Canada-to-US standards crosswalks (example given: switching a valve code can cost only 10 cents once the crosswalk exists). Specific standards referenced: US ASME and Canada CSA B51. Work with industries.
- Use Tukey AI's existing approach to cross-border immigration requirement translation as a model for standards translation.
- Pilot standards crosswalk work in the automotive industry because of existing local US-Canada trade in the region.
- Give owners visibility into the status of delayed goods at the border by federally pulling already-available national data rather than forcing back-and-forth updates. Specific systems named: Canada CARM (Canadian revenue management), US ACE/CBP (Customs and Border Protection), trusted traveler programs, and customs brokers.
- Provide national-level guidance on which tariff codes to use and on available exceptions; do this in partnership with industry alliances or sector-specific groups.
- Align data architecture between Canada and the US for port, freight, and entry statistics. Canada already has a strong public database; US Department of Transportation and related systems (MARAD, the US Maritime Administration, referenced) lack equivalent accessibility. Class 1 Railroads hold the most accurate, near-real-time freight movement data across the US but it is not publicly available.

Team 6 · Closing the Early-stage Deep-tech Commercialization Financing Gap

- Expand non-dilutive and grant funding at state and federal levels (while acknowledging that funding priorities change).
- Build greater awareness of existing deep-tech activity in the region.
- Connect deep-tech companies to non-dilutive sources and investor networks. Reference the Great Lakes Institute scout camps that bring innovators and universities together and link them to metro-area networks.
- Help companies become more ready for investor conversations and for federal government processes.
- Create dedicated deep-tech support, awareness, and ecosystem infrastructure.
- Engage ESD (Empire State Development), NYSERDA, the Governor's office, and corporates.
- Specific deep-tech companies cited as examples of regional activity: Abceutics (University at Buffalo biotech company later acquired by Merck), Dimien (battery materials, acquired by Pure Lithium), and Natrion (battery materials).

Team 7 · Mapping Western New York's Industrial Base Ecosystem

- Build a centralized data-lake mapping tool of manufacturer capabilities. University at Buffalo already has Version 1 underway focused on the semiconductor supply chain. The tool covers supply-chain skills, needs, company attraction, and workforce outputs. Goal: once expanded, the state can see where it is strong (example given: if the region holds 65% of a defense supply chain).
- Validate the semiconductor template and expand it to other industry subsectors.
- Build and train an LLM (large language model) on the capability data.
- Widen the geographic and institutional reach: universities, regional economic development organizations (EDOs), Empire State Development, MEPs, and trade associations.
- Use the tool for research and asset matching (not for real-estate developers; economic development users are appropriate).
- Enable creation of sub-sector verticals that feed upward into manufacturing associations; create a pilot fund to support this.
- A working model was already built by a participant in the room during the session.

- Best-practice starting method: begin with small-group conversations, then move to one-on-one capability-statement discussions.

Team 8 · Agriculture and Food Production Resilience

- Expand education and training programs for farms and food processors; bring in additional partners.
- Increase marketing and give farmers and food processors a stronger voice and representation before government, policymakers, and the right business associations.
- Expand access to capital through government incentives and by aggregating capital from the community and private sources.
- Convene conversations that bring the right people together to share best practices, experiences, and mistakes.
- Bring leaders of workforce development, community colleges, and workforce development practitioners together for focused discussion.
- Survey what other farmers and food processors are already doing; specifically reference the Providence Farm Collective (a nonprofit that helps people learn how to farm) and similar nonprofits; expand and spread their programming.
- Pull in private investment and build public-private partnerships. Government funding is slow; private sector (foundations or community collectives) should fill capital gaps while government provides backend support.

"If we don't solve the structural problems, we will still have problems."

AN ATTENDEE

When the full room was polled on whether the region's binding constraint is technological or cultural/structural, **zero hands went up for technological**.

The structural problem is the lack of a shared language, which creates the lack of visibility and coordination.

Quantitative Signals From the Room + Research

The figures below combine participant-reported operating data with Ad Astra Group's post-event research. Figures originating in the working session should be read as operator signals and are identified by table where applicable; researched figures and model-derived estimates are used to establish scale, concentration, and direction rather than precision.

INDUSTRIAL BASE & MAPPING: 3,000+ manufacturers Buffalo-Rochester (up to 6,000+ with Southern Tier); ~95% SMM (small and mid-sized manufacturers); 90% of WNY's five-county manufacturers employ ≤150. UB semiconductor data lake v1 underway; Empire AI available for the LLM layer. (T2/T7)

GRID: ~10% of substations can handle increased capacity even after upgrades; one failure takes out 3–4 units; no US large-transformer capacity known to the table. The power authority: ~$1B Niagara upgrade (10% of NY power), 1,400 transmission miles this year, Ontario lessons-learned MOU (memorandum of understanding). Vendor oligopoly: Alstom → GE Grid → GE Vernova; FERC/NERC-approved vendor lists effectively Siemens/Hitachi. A town's water rates rose 130% when its largest user burned down; a major retailer intervenes in rate cases on load alone. (T4)

FREIGHT & BORDER: 41% of US containers travel empty (~$10B). 5% of freight on inland waterways; Soo Locks carry 98% of iron ore; $3B appropriated, visibly deprioritized. 85% of Canadian goods still enter tariff-free under USMCA (the United States-Mexico-Canada Agreement); the damage is Section 232 (steel/aluminum/copper + 400+ derivatives, now tariffing whole components); de minimis went to zero last August; CBP is the #2 US revenue generator after the IRS. Peace Bridge: 100% truck-scanning legislated, pilot running on Canadian soil because Buffalo lacks land. Canal maintenance ~$120M/year for status quo; rail restoration ~$1M/mile; Class 1 railroads hold the best freight dataset in existence, non-public. (T5)

CAPITAL & DEEP TECH: university R&D 60/40 downstate/upstate, SBIR ~80/20, **VC 98/2**. A UB biotech → Merck, up to $208M (2024); Natrion built its first production facility in Cheektowaga; the room mostly couldn't name either. Only one company federally approved for small modular reactors (50/77 MW units cited). Farms' available capital is private equity, which ends in land loss; wind-turbine leases run ~$1,000/month per turbine.

TALENT: region retains ~30% of four-year grads; ~70% of graduating tech majors leave; 20,000 Ontario residents hold Buffalo/Rochester degrees; Micron's first wave is 9,000–11,000 hires against a fab already delayed on talent. Industry Forward: 5 BOCES (Boards of Cooperative Educational Services, New York's regional career and technical education agencies) centers, 300+ companies signed to living wages, 165 paid internships and 150+ salaries committed in writing within weeks, first-ever DOL (Department of Labor)-level post-graduation tracking. The machine-shop mechanics: ~$8K/3–4-month training funds as "psychological permission," $7,500 OJT (on-the-job training) grants (the workforce board's US equivalent), journeymen at $35/hr from co-op starts. CNC machinists: top regional wage growth 2018–2023.

THE DATASET MAP (EVERY DATA SOURCE NAMED AT THE EVENT): The working session also surfaced the data sources that would be required to act on its solutions: ACE and CARM for border status; customs brokers for tariff-code and hold-reason aggregation; Class 1 railroads for freight movement; NYS Department of Labor wage records; utility rate-case filings; county GIS (geographic information system) and moratorium records; product and industry classifications; federal contract awards; capability statements; bills of materials; and the parallel mapping efforts already underway across universities, industry groups, and technology providers. **The data is not absent. It is distributed across institutions, formats, access regimes, and classification systems.**

PART 02

FOLLOWING THE HACKATHON

Ad Astra Group has been independently building national intelligence, financial-underwriting, and coordination infrastructure for the industrial base: proprietary ontologies, crosswalks across dozens of global classification systems, and inference and empirical models designed to map and value supply-chain chokepoints and the pathways for intervening in them.

After the hackathon, we mapped the full record of the day, the solutions, repeated phrases, data sources, and common points raised across independent tables, to identify what sat upstream of the problems the room surfaced. The missing shared language described in this report is what that analysis revealed.

We then expanded the work beyond the room: tracing national demand, resolving Western New York's industrial capability and capacity to entities, and connecting the data required to move from diagnosis toward intervention. The goal is not another map for its own sake. It is to show industry, capital, and government what exists, what depends on what, where the constraint sits, and what can be acted on.

Our analysis also incorporated insight from Ad Astra Group's broader network across industry, capital, and senior government leadership. The exhibits in this report, however, are generated from Ad Astra Group's own systems. The inference models remain in beta and should be read for trend, concentration, and linkage rather than precise counts.

Together, the exhibits demonstrate the report's central finding in practice:
translation creates shared language; shared language creates visibility; visibility makes coordination possible.

THE UPSTREAM FINDING: A MISSING SHARED LANGUAGE

> Every bottleneck the tables surfaced is, one level up, a **translation failure**. The systems that need to transact with one another, buyers and suppliers, state and federal regulators, the US and Canada, machines and software, training programs and employers, founders and capital, each operate in their own language. They cannot reliably see one another, and no one owns the translation layer.

The room surfaced the evidence independently:

- **Classification.** NAICS codes frustrate manufacturers when they fail to describe what a facility actually makes; newer product classifications remain incomplete in practice. (T7)
- **Tariffs.** Tariff codes describe traded goods, not the industries and downstream systems that depend on them. Producers struggle to identify applicable exceptions, while policymakers lack a direct view of which supply-chain tiers a tariff decision reaches. (T5)
- **Permitting.** The same physical condition can carry different definitions, processes, and requirements at the state and federal levels. The room repeatedly asked for a common determination layer: “a wetlands is a wetlands.” (T1/T2/T3)
- **Standards.** US and Canadian engineering standards force redesigns and duplicate production even when the underlying product is functionally the same. The proposed solution was literally translation: “this US code = this Canadian code.” (T5)
- **Machine data.** Every machine-tool OEM (original equipment manufacturer) speaks its own proprietary language. Data must be translated and aggregated before plant-level visibility or AI can work. (T2)
- **Border status.** ACE and CARM each hold part of the transaction-level truth, but the systems do not provide a shared status layer. Firms receive holds without the information required to resolve them quickly. (T5)
- **Grid procurement.** Supplier qualification can run 6–18 months because safety, cybersecurity, and qualification requirements are not standardized across buyers. (T4)
- **Workforce.** Job-role definitions, training classifications, wage records, employer-built programs, and education data do not resolve cleanly around the same skills and demand. The talent exists in pieces, but the system cannot see the pipeline end to end. (T1/T4/T7)

> **Seen through this lens, the eight tables' solutions converge: build the translation layer, establish a shared ground truth, and give someone trusted responsibility for maintaining it.**

How the Missing Shared Language Inhibits Ready Capability

Consider a grid transformer.

A transformer is one physical industrial system. Its critical inputs, however, are classified and traded separately: dedicated parts under HS Code 8504.90; grain-oriented electrical steel under Chapter 72; copper winding wire under 8544; insulating oil across petroleum and chemical chapters; bushings under 8546; and many additional components under still more classifications.

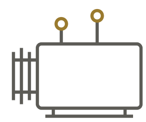
A tariff action touching any one of those inputs can change the economics of the finished transformer. No single code reveals the transformer's aggregate exposure.

The transformer is the structural problem in miniature.

The dependency is real. The US Department of Energy reported in 2024 that 82% of large power transformers serving the US market are imported.

Source: US Department of Energy, Large Power Transformer Resilience Report to Congress (July 2024).

One transformer. Fragmented visibility.



POWER TRANSFORMER

↑

GOES steel core	Copper winding	Bushings	Insulating oil	Dedicated parts
HS Ch. 72	HS 8544	HS 8546	HS Ch. 27/38	HS 8504.90

and many more components: tank, radiators, tap changers, controls… each classified separately (codes shown are Harmonized System headings)

IF THE TARIFF ON ONE INPUT CHANGES, WHAT DOES IT AFFECT?

TARIFF ACTION

↓

GOES STEEL · CHAPTER 72

✗

WHICH SUPPLIERS?

✗

WHICH FACILITIES?

✗

WHICH TRANSFORMERS?

✗

WHICH GRID PROJECTS?

We can see the tariff treatment of the input. We cannot publicly trace what depends on it.

The data exists. The relationships do not.

America has classification systems for trade, products, establishments, occupations, and education. They are not bad systems. They were designed to answer different administrative and statistical questions, at different units of analysis, and are maintained by different institutions.

HTS	NAICS	NAPCS	SOC	CIP
Trade	**Industry**	**Product**	**Workforce**	**Training**
What crossed the border?	What does the establishment do?	What is being sold?	What job is performed?	What program was taught?

HTS: Harmonized Tariff Schedule · NAICS: North American Industry Classification System · NAPCS: North American Product Classification System · SOC: Standard Occupational Classification · CIP: Classification of Instructional Programs

Exports introduce another system, Schedule B, which aligns with HTS through six digits before the US classifications diverge.

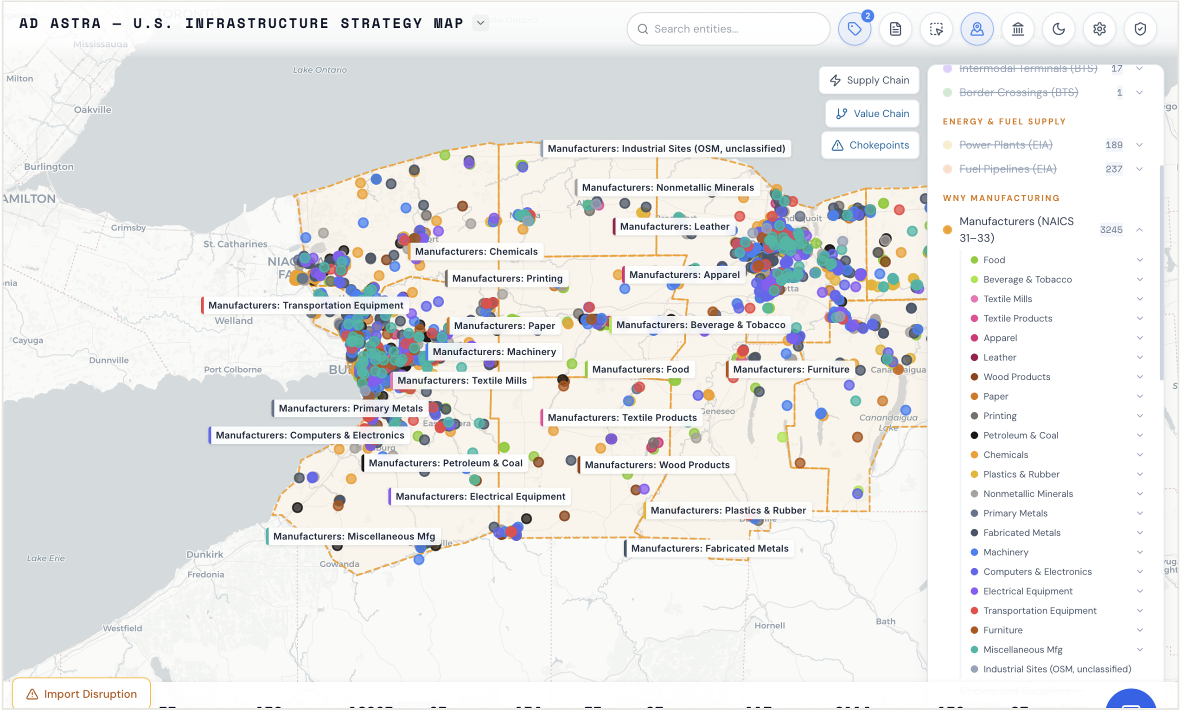
Each system answers a legitimate question. Some systems have official crosswalks; others can be linked statistically. What none of them preserves is the identity of the physical industrial system end to end.

There are bridges. There is not a graph.

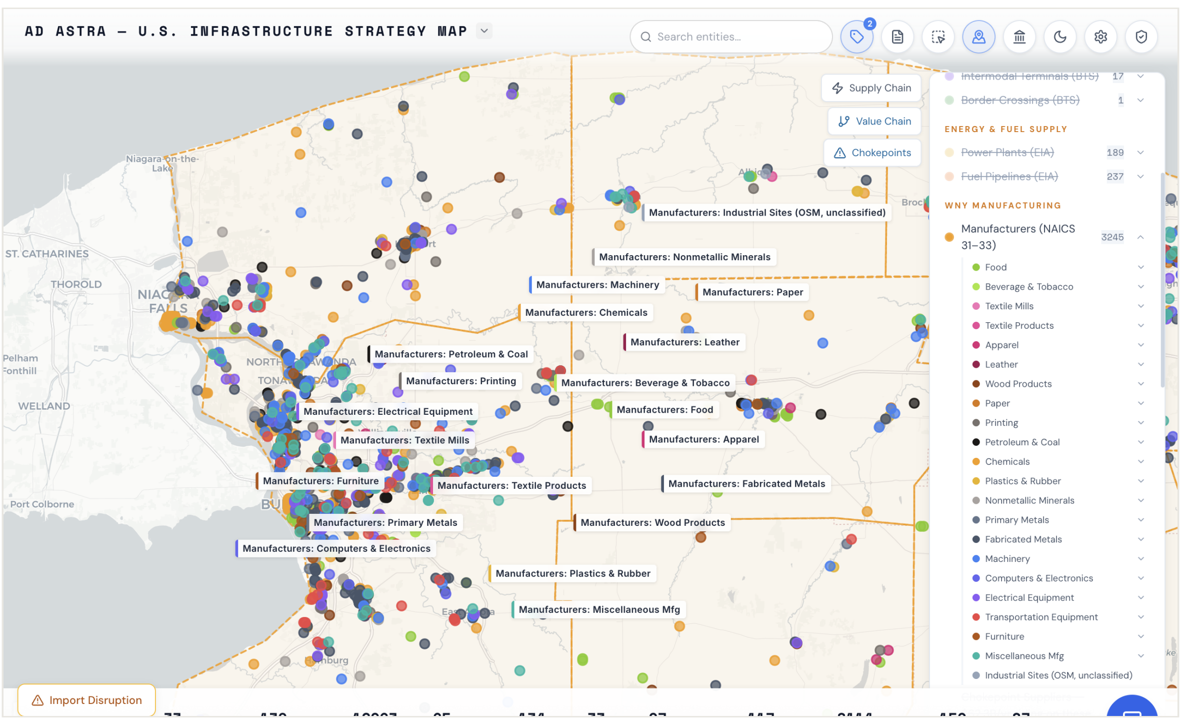
transformer ↔ components and materials ↔ producing facilities ↔ capability and capacity ↔ occupations and skills ↔ training programs and throughput ↔ national demand ↔ tariff exposure and exclusions ↔ procurement ↔ capital ↔ regulatory intervention

> THE STRATEGICALLY IMPORTANT QUESTION CUTS ACROSS EVERY ONE OF THOSE SYSTEMS
>
> If domestic transformer demand rises, which facilities can produce the transformer and its critical components? Which imported materials do those facilities depend on? Which tariff actions affect those inputs? Which occupations constrain additional production? Which training programs feed them? Which regulations and permits govern expansion? Where does capacity run out first, and where should capital or policy intervene?
>
> **No single classification system was designed to answer that question.**
>
> **That is the missing resolution layer.**

- **Capital cannot find capability it cannot see.** Lack of capital surfaced repeatedly across deep tech, agriculture, manufacturing, and infrastructure. But when we examined federal funding programs and new solicitations, many contained no structured identifier connecting the opportunity to the industrial capabilities it was intended to support; the closest examples were programs using broad NAICS classifications. The same problem works in reverse: Western New York can coordinate perfectly within the region and still remain invisible to national demand originating elsewhere if the demand signal cannot resolve to the facilities and components the region can actually provide.



Western New York has thousands of industrial capabilities that national demand cannot systematically discover. The map resolves roughly 3,000 manufacturers in NAICS 31–33 to their physical locations.

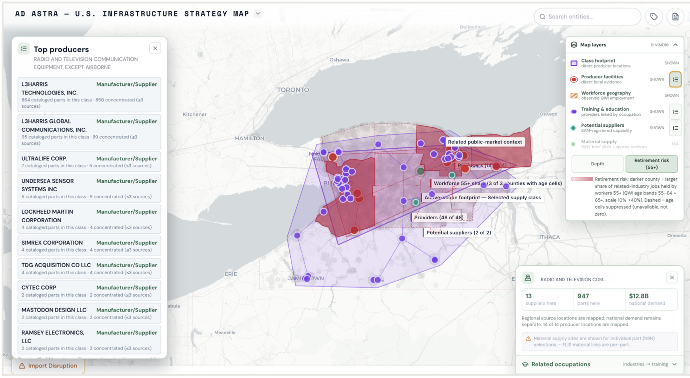


The density becomes clearer at corridor level. Buffalo, Tonawanda, and Niagara Falls contain manufacturers across multiple sectors within practical supply-run distance of one another. What appears fragmented in industry statistics becomes a geographically connected production base when resolved to entities.

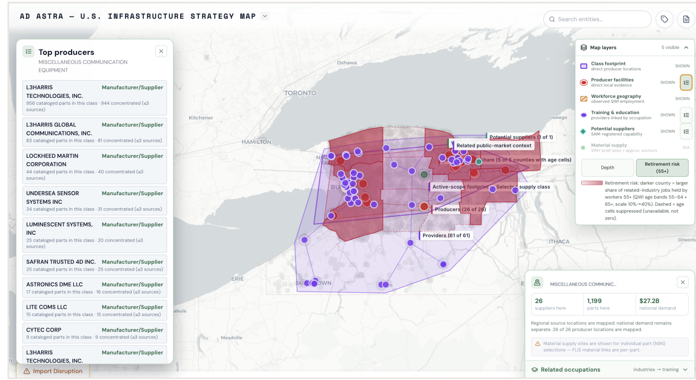
Where the constraint is sharpest, the map already begins to resolve it end to end.

The panels below isolate supply classes where Western New York firms produce parts with three or fewer cataloged suppliers nationwide. Each view connects those regional suppliers to the national demand behind them and to county-level workforce retirement risk.

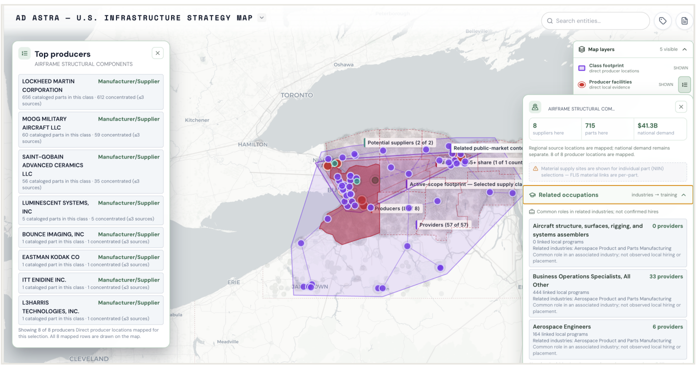
The models are still being finalized. Once the relevant occupations resolve to those supply classes, and the training programs resolve to the occupations, the aging-workforce layer stops being a general warning and becomes a priority list.



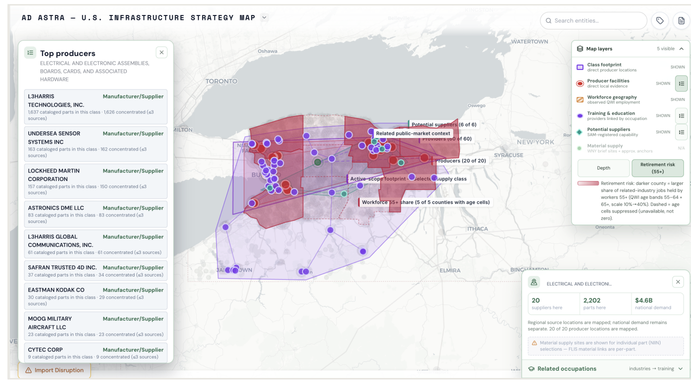
Radio and television communication equipment: 13 regional suppliers hold 947 cataloged parts, nearly all concentrated to three or fewer sources nationwide, against $12.8B in national demand.



Miscellaneous communication equipment: 26 suppliers hold 1,199 parts against $27.2B in national demand. Concentration this sharp can indicate national single-point-of-failure risk at individual facilities.



Airframe structural components: 8 suppliers hold 715 parts against $41.3B in national demand, with the related occupations and local training programs linked into view.



Electrical and electronic assemblies: 20 suppliers hold 2,202 low-source parts against $4.6B in national demand, overlaid on the counties where the related workforce skews oldest.

- **Talent exists but cannot be found, and training cannot be targeted.** The workforce problem breaks at the same translation layer. Postsecondary institutions report programs under federal CIP codes, and an official NCES/BLS crosswalk connects CIP programs to SOC occupations. At the college level, training can therefore be translated, at least partially, into the workforce categories employers demand. That visibility weakens earlier in the pipeline: only state-approved high-school CTE (Career and Technical Education) programs systematically carry CIP codes; general coursework sits in separate systems or is not coded at all. Employer-built programs create another blind spot: major companies across Western New York have built their own apprenticeships, technician pipelines, and internal training programs, but there is no shared system for discovering and tracking them as they evolve. The result is a workforce system that changes continuously without a shared language for seeing the change.

COMPANY	PROGRAM ANCHOR	APPROX REVENUE	EMPLOYEES	INDUSTRY · APPROX MARKET
TOP 9 COMPANY-DEVELOPED WORKFORCE TRAINING PROGRAMS IN WESTERN NEW YORK				
1. GM Tonawanda · Lockport	UAW (United Auto Workers) joint registered apprenticeship, ~7,920 hrs on-the-job training	~$187B (2024)	~160K global ~1,500 local	Automotive · global market ~$3T
2. Ford Buffalo Stamping	UAW-Ford NJAC (National Joint Apprenticeship Committee) registered apprenticeship system	~$185B (2024)	~170K global ~1,000 local	Automotive · ~$3T
3. Corning Southern Tier	Technician Talent Pipeline since 2008, SUNY CCC (Corning Community College) apprenticeship, NSF (National Science Foundation) optics feeder	~$14.5B (2024)	~50K global	Specialty glass / optical fiber · fiber market ~$9B
4. Cummins Jamestown Engine Plant	NYSDOL (New York State Department of Labor)-confirmed sponsor: four active registered trades (electrician since 1984, toolmaker, machinery mechanic, drafter); operator-to-technician program	~$34B (2024)	~70K global ~1,500 local	Engines / power systems · diesel engine market ~$60B
5. Moog East Aurora		~$3.6B (FY24)	~13K global	

	Structured company machinist apprenticeship (8–10 per cohort); dedicated Operations Training Center (2025)			Aerospace & defense motion control · ~$2.4T defense spend
6. Edwards Vacuum Genesee STAMP (Science and Technology Advanced Manufacturing Park)	In-house technical training; BOCES/RTMA (Rochester Technology & Manufacturing Association) pre-apprenticeship; $18M CHIPS (CHIPS and Science Act) award	`~$4.5B segment`	~55K group up to 600 local	Semiconductor vacuum equipment · ~$9B
7. L3Harris Rochester	Technical Training Program; tuition-sponsored associate degree (RIT, Rochester Institute of Technology, certified)	`~$21B (2024)`	~48K global	Defense electronics · ~$2.4T defense spend
8. Tesla Gigafactory NY	Manufacturing Development Program with Northland; Nevada MDP now a licensed apprenticeship	`~$98B (2024)`	~125K global ~1,800 local	EV / energy · EV market ~$800B
9. Optimax Systems Ontario (Rochester region)	Precision Optics Manufacturing (POM) apprenticeship, company-built with published curriculum; largest US prism/lens maker	`~$80M est (private)`	~400	Precision optics · ~$12B; feeds defense, semiconductor, space

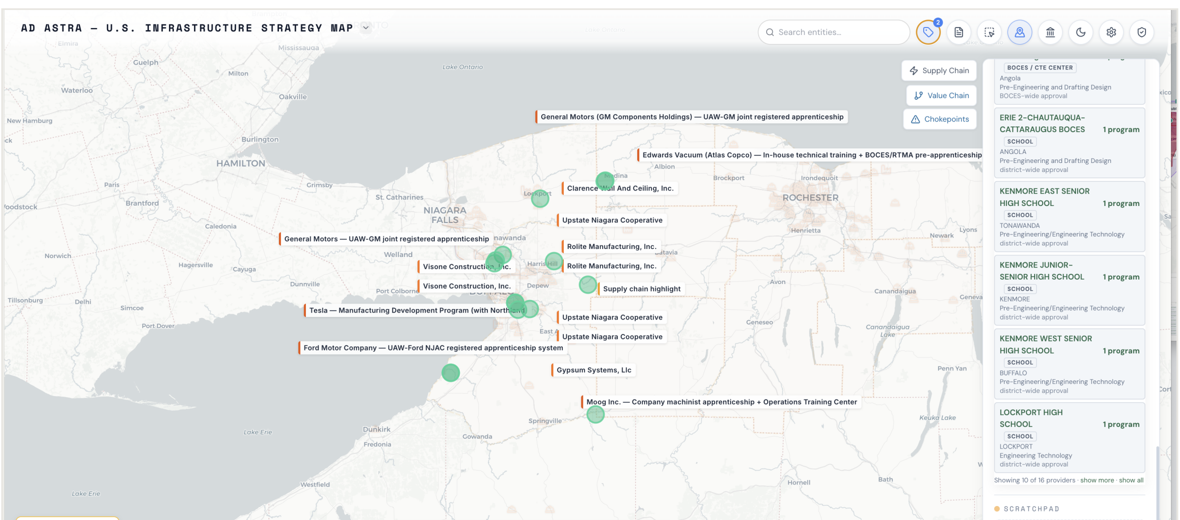
Company financial figures are approximate (FY2024 or most recent public) and provided for context; private-company revenues are estimates. Industry market sizes are rounded reference figures.

Proximity is what makes the handoff possible.

The workforce constraint the room described was not simply a shortage of people. It was a shortage of receiving capacity for knowledge.

Western New York already has many of the pieces: feeder high schools, employer-built workforce programs, registered apprenticeships, community colleges, and experienced workers inside critical producers. What matters is whether those pipelines are close enough, sustained enough, and structured enough for knowledge to move before the people carrying it retire.

The map below places the region's feeder schools, employer programs, and apprenticeships in proximity to the producers whose expertise is aging out.



The receiving pipelines exist and they are close: feeder high schools, the top companies' workforce programs, and registered apprenticeships sit within proximity of the producers whose expertise is aging out.

The highest-value pipelines are the ones that create extended contact between experienced workers and the people replacing them. Much of a master tradesperson's expertise is tacit: judgment, troubleshooting intuition, sequencing, and edge-case experience that is never fully written down.

That is why the workforce problem is also a clock.

Roughly 24% of production workers are already 55 or older, while Deloitte and the Manufacturing Institute project that manufacturers may need as many as 3.8 million workers from 2024–2033, with roughly 1.9 million positions at risk of going unfilled.

The question is not only who can be trained.
It is who can receive the knowledge while it is still here.

The receiving pipelines, and their estimated eligible populations in Western New York:

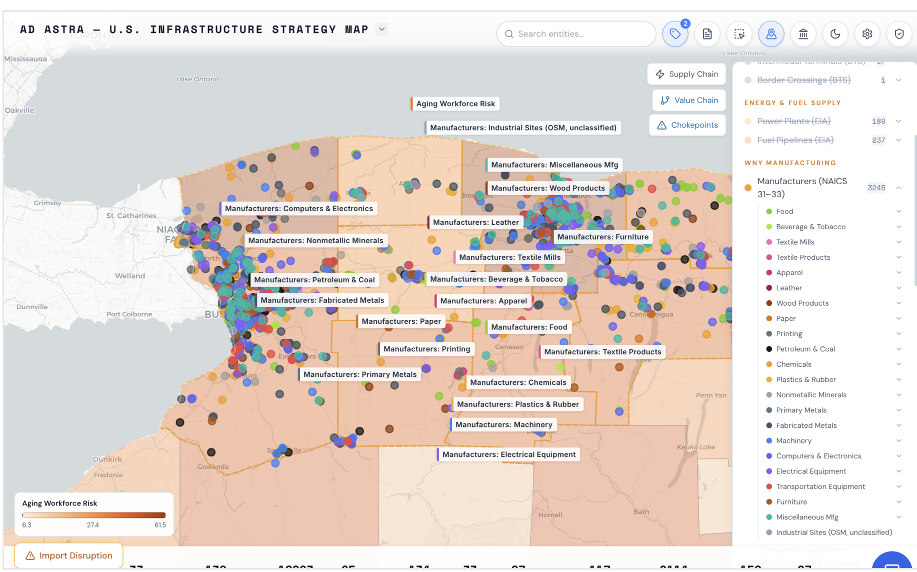
TRACKING GROUP	WHY IT CAN RECEIVE THE KNOWLEDGE	ESTIMATED ELIGIBLE RECEIVING POPULATION, WNY
Registered apprentices (RAPs)	Multi-year paired on-the-job training under journeymen; ~94% retention after completion per the US Department of Labor; the most effective vehicle for tacit transfer	Receiving now: New York holds **17,000+** active apprentices in 900+ programs; WNY share est. **~1,700–2,500**
Internal upskilling (grow-your-own)	Operators and helpers advanced into skilled trades; highest culture fit and fastest absorption of site-specific knowledge	Eligible receivers est. **~75K**: the under-55 share (~76%) of the ~100K manufacturing workers in the Buffalo and Rochester metros (June 2026)
BOCES CTE + community college trades	Employer co-designed certificates, co-ops, and dual enrollment; frequent RAP sponsors and instruction providers	In the pipeline now: Industry Forward alone runs 5 BOCES centers with 300+ companies and **1,000+** placements/year; regional trades enrollment est. low thousands/year
Veterans + transitioning service members	Technical aptitude and structured-mentorship readiness; SkillBridge, Helmets to Hardhats, and similar grant advanced standing	Eligible receivers est. **~35,000–40,000** working-age veterans, roughly a third of the ~113,000 all-age total across the nine counties (~49% of veterans nationally are 65+); the live entry stream is the annual flow of transitioning service members
Pre-apprenticeship + youth exposure	The feeder system into RAPs and CTE (the battery-lab-in-a-high-school model is scaling to five regions)	Entering the feeder system est. hundreds/year today; the growth lever
Non-traditional pools	Career changers, underrepresented groups, skilled immigrants, second-chance workers; succeed when funneled into the pipelines above	Not separately tracked anywhere: the tracking gap itself

Population figures are order-of-magnitude estimates for trend and concentration. Sources: NYSDOL apprenticeship counts · US DOL apprenticeship outcomes · BLS Buffalo and Rochester metro summaries · Census county veteran counts · Deloitte / Manufacturing Institute workforce projections.

The clock, demonstrated. The knowledge-transfer clock is spatial.

The counties with the deepest manufacturing footprints are also among the places where the industrial workforce skews oldest. Once that aging risk is tied to specific facilities, occupations, parts, and national demand, it becomes possible to distinguish a general workforce problem from an urgent intervention.

The places where high demand and aging knowledge overlap are the places with the least time left to act.



The knowledge-transfer clock is spatial: the counties with the deepest manufacturing footprints are the same counties where the workforce skews oldest (share of workers 55+, scale 6.3–61.5).

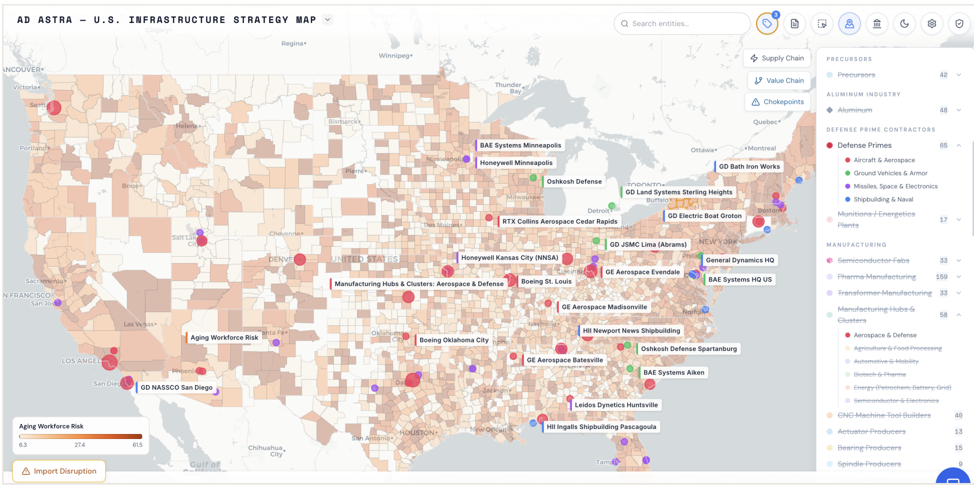
One of Western New York's major industrial strengths is aerospace and defense. The national map below shows the major aerospace and defense manufacturing hubs and defense prime contractors that generate demand for suppliers like those in Western New York.

Beneath them is the same county-level aging-workforce risk visible in the region.

Western New York therefore shares more than supply chains with the industrial hubs it serves. It shares the same knowledge-transfer clock.

That overlap is also an opportunity. Regions supplying the same national demand do not need to build every training model, succession pipeline, and demand signal independently. Once the capabilities and occupations are expressed in a shared language, regions can coordinate around the same requirements.

The hubs Western New York supplies are on the same clock it is.



The hubs Western New York supplies are on the same clock it is: the national aerospace and defense base sits over the same county-level aging risk, coast to coast.

Cross-Border Visibility: The Data Exists. The Systems Don't Share It.

The cross-border table's ask reduces to a relatively concrete problem: the US and Canadian systems already know much of what companies need, but that information is distributed across separate public and restricted systems.

The inventory below shows what can be pulled publicly now, what each source contains, and where visibility stops. It is the starting architecture for implementing the room's proposed cross-border coordination layer.

SOURCE	SIDE	WHAT IT SHOWS	GRANULARITY · ACCESS
PUBLICLY AVAILABLE NOW			
BTS Border Crossing/Entry Data (Bureau of Transportation Statistics)	US inbound	Monthly counts of inbound trucks, personal vehicles, buses, trains, containers (loaded/unloaded), passengers, pedestrians at individual land ports	Per port of entry, monthly, back to the mid-1990s · free download; inbound only
BTS TransBorder Freight Data	Bilateral	Monthly US–Canada freight value (some weight) by mode (truck, rail, pipeline, vessel, air), commodity, port, state	Corridor-level analysis · free, interactive tools + raw downloads
US Census trade statistics / USITC DataWeb (US International Trade Commission)	US	HS-level (Harmonized System, to 10-digit) monthly imports/exports with Canada; imports derive from ACE filings	Commodity-level, monthly · free APIs
CBP Public Data Portal	US	Traveler/conveyance volumes, northern-border encounters, seizure and enforcement metrics	Dashboards + downloads, updated frequently
Statistics Canada Frontier Counts	Canada inbound	Travelers and vehicles entering Canada by mode, residence, trip type, port; some daily leading indicators (CBSA, the Canada Border Services Agency; IPIL)	Per port, monthly (some daily) · free via StatCan and open.canada.ca
StatCan merchandise trade tables	Canada	HS-level (8/10-digit) imports/exports with the US, by province and mode	Commodity-level, monthly · free
Canadian Importers Database (ISED, Innovation, Science and Economic Development Canada)	Canada	Major Canadian importers by HS product, city/province, origin country: company name and location only	Firm list, no shipment values · free, searchable + XLSX
	Both		Live feeds, some CSV extracts · free

CBSA / CBP border wait times		Live and some historical wait times at land crossings, both directions	
THE WALL: NOT PUBLIC			
ACE (US Single Window, CBP)	US	Manifests, entries, entry summaries: the transaction-level truth. Only account holders see their own data; public output is the derived aggregates above	No public bulk access; researcher access via restricted-use linked datasets only
CARM (CBSA)	Canada	Commercial accounting declarations, duties, statements: Canada's system of record since late 2024. Account holders only; public elements limited to tariff reference APIs and published rulings	No public bulk access; aggregates flow to StatCan
Class 1 railroad freight data	US	The most accurate, near-real-time freight movement data across the US, named at the event as the best freight dataset in existence	Not public; relationship-gated with the railroads

The public layer has structural limits. US and Canadian series often describe opposite sides of the same movement; some data lags; crossing counts are not unique entities; and confidentiality rules appropriately keep transaction-level firm data closed.

But this distinction matters: the data required to improve operational status often already exists.

ACE and CARM hold transaction-level information on their respective sides of the border. The missing build is not simply "more public data." It is a permissioned status-sharing and translation layer that lets the relevant parties understand what is happening without exposing commercially sensitive information.

The room also identified practical aggregation points for information absent from public datasets: customs brokers for tariff classifications and hold reasons, and trusted-traveler and federal systems for additional status data.

Where coordination has an owner, it already works. The Permitting Council provides a useful model.

Created under FAST-41, the Federal Permitting Improvement Steering Council coordinates federal environmental reviews and approvals for major infrastructure projects. Covered projects receive a designated lead agency, a coordinated project plan, a public permitting timetable, and visible status.

In its most recent reported year, 13 covered projects completed federal permitting and the active portfolio grew to 76 projects across 25 states. The Council also began extending the coordination model to states through its first statewide memorandum of understanding.

One hackathon team independently asked for nearly the same instrument at the state level: designate a lead agency within 90 days and publish a tracker showing how long projects spend in permitting.

This is not purely a classification problem. It demonstrates the broader architecture:

named owner + shared process + common status + visible ground truth = coordination.

Sources: Permitting Council, Year One FAST-41 Accomplishments · the federal permitting dashboard · the Permitting Council's mission · full project dataset (CSV)

PROJECT	LOCATION	STATUS	EST. COST	LINK TO THE REGION
FAST-41 COVERED PROJECTS IN NEW YORK STATE				
Kilbourne Graphite Project	St. Lawrence Co.	IN PROGRESS	—	Battery-anode feedstock for the battery/ energy-storage vertical
Empire Wind · South Fork Wind	Federal offshore	REVIEW COMPLETE	—	Grid demand and the offshore-wind volatility documented by Team 3
Bluepoint Wind 1	Federal offshore	PLANNED	—	Same
Attentive Energy Two	Federal offshore	CANCELLED	$200M	Whiplash evidence: covered status did not survive the policy turn

ABOUT

AD ASTRA GROUP

Ad Astra Group builds intelligence, financial-underwriting, and coordination infrastructure for the American industrial base.

Its systems include proprietary ontologies, crosswalks across dozens of global classification systems, and inference and empirical models designed to map supply-chain chokepoints, value intervention pathways, and resolve the industrial base to entity level. The U.S. Infrastructure Strategy Map connects demand, capability, workforce, capital, and other constraints that today sit invisible to one another so that industry, capital, and government can see the same picture and act on it.

The Industrial Base Hackathons are one sensing mechanism within that work. Operators closest to the problems surface ground truth in the room; the research that follows traces those problems upstream and converts the record into implementable intelligence.

The pattern in Western New York is not unique to Western New York. The same upstream architecture appeared in the first two working sessions across different industries, bottlenecks, and regions. Its recurrence helped confirm a decision Ad Astra Group had already reached in the month prior: pause the hackathon series and concentrate resources on the underlying intelligence, underwriting, and coordination infrastructure.

What began as infrastructure complementary to the sessions has proven, through the sessions themselves and through inbound demand from major institutions across industry, capital, and government, to be the highest-leverage work Ad Astra Group can build now.

Ad Astra Group's broader work also includes funding-policy infrastructure designed to make industrial companies more bankable and national-scale mechanisms focused on four recurring failures across the industrial base: capital access, workforce shortages, narrative misalignment, and institutional fragmentation.

Media and updates: industrialbasehackathons.com · adastragroup.io

THE RECORD

DEEP DIVE OF THE WORKING SESSION, BY TABLE

TEAM 1: TALENT PIPELINES & TRAINING

The labor market is becoming a zero-sum poaching loop. Firms increasingly compete for the same existing workers rather than creating new supply, pushing wages higher without solving the underlying shortage. Micron's first wave alone represents roughly 9,000–11,000 hires; the structural challenge is how to train thousands of people for jobs employers cannot credibly promise five years in advance.

The root causes are systemic, not cyclical. Students still picture manufacturing as a smokestack. P–12 systems have college counselors but few career counselors. BOCES retains stigma. The region lacks organic population growth. Employers face compliance burden, and every hour spent training is an hour a machine may not be producing.

The system often misidentifies industrial aptitude. Hands-on learners can be sorted out by test-based education systems even though the same people may later run sophisticated five-axis equipment and solve problems few classroom measures capture.

The shop-level mechanics are already known. Recruit through co-op teachers rather than job boards. Give students enough time in a shop to self-select. Pitch parents and students together: paid from day one, roughly $25–28/hour by year three in the example raised, with no tuition debt. Hire peer cohorts for retention. Use benefits to address absenteeism. Small public incentives can unlock much larger employer investment.

Working school-industry models already exist. The room pointed to a battery-lab-in-a-high-school model where students can be certified and hired before graduation, now expanding to additional regions. Participants also reported that principal-level relationships can move in days where superintendent-first approaches take far longer. The lesson: one standardized employer-school bridge can outperform dozens of separate bureaucratic relationships.

The chokepoint almost no program solves is the journeyman ratio. Apprenticeship intake is limited by the number of experienced people available to supervise apprentices. Retirements therefore remove both labor and training capacity at the same time. Apprentices can be added relatively quickly. Journeymen cannot.

The architecture the table designed resembles a medical match. Industry-sponsored K–12 exposure, mandatory career-immersion days, ranked-choice placement into pre-committed employer slots, financing parity between apprenticeship and college, and a first-year college offramp. The aim is not to redirect everyone. As one participant put it: “We're not trying to save everyone. We're trying to save someone.”

TEAM 2: SUPPLY CHAIN VISIBILITY

The data problem begins inside the company. Sales can promise what operations cannot deliver because quotes are based on incomplete or stale cost and capacity data. The failure can begin before the order is even booked.

The same mechanics repeat across the supply chain. ERP (enterprise resource planning) forecasts are treated as ground truth while operators maintain parallel spreadsheets. Each tier pads lead times to absorb uncertainty. Small changes in downstream demand amplify upstream. Sales is rewarded for booking orders, not necessarily for whether the system can deliver them.

Latent capacity is real. Machines sit idle during unmanaged changeovers and unplanned maintenance. Better scheduling, preventive maintenance, and operating visibility can recover capacity without immediately adding new capital equipment.

The technical prerequisite is translation. Modern machines already generate data, but every machine-tool OEM speaks its own proprietary language. The sequence is: clean data layer → common repository → role-based visibility → then AI for predictive maintenance, scheduling, and lead-time quoting.

Multi-tier visibility tends to exist only where someone is required to pay for it. Defense, space, and selected critical-medicine programs maintain deeper control-tower visibility because redundancy and coordination are treated as requirements. The commercial market rarely funds that slack on its own.

Antitrust constraints should shape the design. The room proposed sharing exception status rather than order books: a red/yellow/green alert layer that reveals where intervention is needed without exposing sensitive commercial information. Universities were frequently named as possible trusted third-party stewards.

Compliance can quietly create sole-source risk. The room reported that fewer than roughly 3% of regional manufacturers were pursuing CMMC; manufacturers with small defense exposure may choose to leave the customer rather than absorb the compliance burden. With 90% of manufacturers in the five-county region employing 150 people or fewer, fixed compliance overhead can directly shrink the supplier base.

Knowledge transfer is also a data problem. Tacit expertise is often never codified and can even be withheld as job security. The table's answer was to make documentation a day-one operating expectation and build the mission locally around the people and facilities involved.

TEAM 3: REGULATORY & PERMITTING BOTTLENECKS

"It can't be never, anywhere, anytime. There must be places we can do this."

Speed has been lost to process as much as physics. The room contrasted historic infrastructure timelines with modern approval cycles and pointed to emergency cases where review compressed dramatically once urgency became undeniable.

Uncertainty is more damaging than duration. A six-month process that reliably takes six months can be financed and scheduled. A process that might end tomorrow or next year cannot. Participants repeatedly described policy whiplash across administrations as a tax on long-lived capital.

Long-lead producers are flying blind on demand. One fiber producer described needing a demand signal more than two years in advance; a wrong capacity decision can carry billion-dollar consequences and thousands of jobs. The same problem appears upstream of AI infrastructure, where a single data center depends on roughly 150 companies producing different pieces of the system.

The most fixable failure is ownership. One project spent much of a two-year timeline determining which agency was responsible. SEQRA (New York's State Environmental Quality Review Act) and NEPA can impose separate processes on the same project. The room's answer was simple: name the lead agency.

The converged proposal was a trusted public siting-and-demand layer. Constraint maps are useful only when paired with who intends to build what, where, and when. Participants cared more about predictability than nominal speed. The system must also assign responsibility for county-level data quality; scraped records are only as useful as the underlying data.

Harmonization mechanisms already exist. Participants pointed to state-federal one-dataset/one-permit arrangements, provisions allowing one review to satisfy another, targeted exemptions, and file-then-track systems as evidence that duplication can be reduced without eliminating review.

Public perception is itself a siting constraint. New infrastructure can trigger the same fear cycles previously seen around other technologies. Better information and clear siting rules therefore matter alongside formal regulatory reform.

TEAM 4: GRID MODERNIZATION & TRANSMISSION

"We trained a million people and placed 100."

The constraint is the widening gap between the modernization of everything else and the modernization of the grid. Hospitals, manufacturers, data centers, and public infrastructure are all adding load. Progress itself is becoming the demand shock.

The equipment chokepoint is structural. The room reported transformer lead times around 56 weeks and extremely limited domestic large-transformer capacity. Large turbines that were once produced domestically now arrive from Europe. Vendor consolidation and approved-supplier requirements further narrow the available base.

The binding physical layer is often the substation. Participants estimated that only around 10% of substations could handle increased capacity even after equipment upgrades. Summer curtailment is already occurring in parts of the system.

Rate economics decide what gets built. Utilities earn regulated returns on capital investment, large co-located users can materially change local rate structures, and stranded-asset risk runs in both directions. The table proposed requiring very large loads either to remain flexible or contribute to the generation and infrastructure they require.

Regional freight is not an easy near-term escape valve. Maintaining the canal already carries substantial annual cost; restoring removed rail is expensive; and Great Lakes vessel constraints limit what can move by water.

The workforce problem mirrors the equipment problem. Union trades are retiring faster than replacements arrive, while too few people are positioned to receive the knowledge. Participants argued that workforce programs should be measured by durable in-state placements, not simply by how many people enter training.

The table's regulatory thesis was outcome-based. Set the bounding conditions (reliability, emissions, downtime, safety, cybersecurity) and let operators determine how to meet them. Standardize the safety and cyber requirements that currently drive supplier qualification toward 6–18 months, and create a structured feedback loop in which operators can identify the rules imposing the highest cost for the least outcome.

Behind-the-meter and modular generation were treated as increasingly inevitable. If rate increases are required, participants argued they should produce visible resilience for ratepayers, while incentives should reward outcomes rather than prescribe a single technical pathway.

TEAM 5: CROSS-BORDER US–CANADA COORDINATION

The perception gap itself suppresses trade. The room emphasized that roughly 85% of Canadian goods still enter the US tariff-free under USMCA, a fact many smaller firms do not know. At the same time, Section 232 exposure across steel, aluminum, copper, and derivative products has made classification far more consequential.

Tariff navigation favors incumbents. Firms with tariff counsel and deep HTS fluency can manage the system. New entrants must absorb the learning curve from scratch, and some simply decline cross-border business when there is no clear place to get an answer.

Border failure is often mundane and information-shaped. A code can be wrong by one digit. A company can receive a notice saying only that a product is on hold while detention costs continue. ACE and CARM already contain much of the status data required to improve that experience; customs brokers are a natural aggregation point.

Standards are a large but quieter cost. US and Canadian code differences require redesigns, PE stamps do not automatically travel across jurisdictions, and manufacturers can end up maintaining duplicate processes for functionally equivalent products.

Transportation remains unresolved. Truck-driver shortages exist on both sides of the border, while oversized industrial loads have few practical alternatives. Rail cannot accommodate every product and barge can be materially more expensive.

Reshoring is part-by-part work. One regional manufacturer reported canvassing more than 1,200 US and Mexican foundries for a single cast-iron part before finding the only qualified bidder across the border in Niagara Falls, Ontario. The example captures the real structure of the Great Lakes industrial base: national resilience does not always fit neatly inside a national border.

TEAM 6: DEEP TECH FINANCING GAP

The capital gap is also a retention gap. Roughly 70% of graduating technology majors leave the region, while approximately 20,000 Ontario residents hold Buffalo or Rochester degrees. A stronger Great Lakes deep-tech capital network therefore doubles as a talent-retention strategy.

Deep tech's clock is the bottleneck. Ten-year commercialization horizons collide with political cycles, corporate budgeting cycles, and conventional investor time horizons. Federal, state, philanthropic, and private funding streams rarely operate as one continuum.

The funnel is the story. University R&D funding is far less geographically concentrated than later-stage capital: the room cited an approximately 60/40 downstate-upstate R&D split, roughly 80/20 for SBIR (Small Business Innovation Research), and approximately 98/2 for venture capital. The further a company moves toward commercialization, the more capital leaves the region.

The region does not consistently know its own wins. Few participants recognized major local deep-tech successes raised in the room. That awareness gap matters: if ecosystem leaders cannot identify the companies, technologies, and exits already present, they cannot consistently connect the next generation to investors or non-dilutive resources.

A front door already exists in pieces. Existing centers can move research out of universities and into companies, and run the process in reverse by matching company problems with faculty and attached funding. The opportunity is to make those pathways visible and easier to enter.

The proposals are implementable on a near-term horizon. The table identified a dedicated deep-tech accelerator focused on investor readiness, Great Lakes investor scout camps, and structured readiness support for federal processes, with ESD, NYSERDA, the Governor's office, and corporates involved.

TEAM 7: CAPABILITY MAPPING & THE ENTREPRENEURIAL ECOSYSTEM

The core problem is discoverability. More than 3,000 manufacturers sit across Buffalo and Rochester, most of them small or midsized, yet buyers, talent, policymakers, and even neighboring manufacturers often cannot see what they can do. For firms in the $1M–$10M revenue range, losing one major customer can be existential.

The demand is personal. One manufacturer described repeatedly seeing regional maps that did not include the company: “I keep seeing this one map and I'm not on it. How do I get on it?”

Semiconductor localization is not all-or-nothing. The table's realistic target was the portion of spend that can actually move. Qualification is slow, but once a supplier is qualified the relationship can become durable. Manufacturers respond better to “match what I already make to a contract” than to broad calls to retool.

A replicable mapping method already exists. The University at Buffalo semiconductor work provides a starting template that can be extended vertically into optics, batteries, semiconductors, and other sectors. Capability statements should be built with companies, not inferred solely from scraped classifications.

Maintenance is where maps die. Data should be self-reported where possible, independently verified, and assigned to institutions with an incentive to refresh it. Trade associations and sector groups are natural candidates to own vertical maintenance.

The AI layer becomes useful only after the capability layer exists. Once a verified capability database is in place, a bill of materials can be matched against local producers, missing components can be identified systematically, and repeatedly missing capabilities become economic-development recruitment targets.

Governance decides whether the system survives. The room favored a coalition or consortium with a neutral steward, differentiated access by use case, and one statewide layer rather than proliferating disconnected maps. The payoff is not another directory; it is the ability to make a data-backed case for where a prime contractor, supplier, workforce program, or investment belongs.

TEAM 8: AGRICULTURE & FOOD RESILIENCE

The experienced-talent gap extends into agriculture. Employers need people with technical readiness, not simply entry-level labor. Mechatronics and technician skills increasingly overlap across agriculture, manufacturing, semiconductors, life sciences, and healthcare, creating an opportunity for shared training infrastructure.

The region's freight position is underused. Buffalo sits between Toronto and New York City with significant transportation assets, but participants saw no coherent multimodal strategy. For freight that is not just-in-time, modal shifts can materially lower costs.

Farm economics are breaking at multiple layers at once. Fertilizer, feed, fuel, labor shortages, invasive species, weather volatility, and generational transition all compress already-thin operating margins.

Fertilizer dependency may contain a local circular-economy opportunity. The table contrasted imported fertilizer dependence with Great Lakes fish waste, zebra mussels, and aquaculture byproducts that remain undercommercialized nearby.

Land loss is a capital problem. When a farm is distressed, conventional private-equity acquisition can end family ownership; long-term energy leases can remove prime acreage from production. Participants contrasted strong protections for wetlands with comparatively weak strategic protection of prime agricultural land.

The room saw no equivalent of an energy-security doctrine for food. Participants pointed to recent supply disruptions and import dependence as evidence that food resilience remains treated as a sector issue rather than strategic industrial capacity.

Biosecurity is already an industrial operating requirement. A single breach can destroy a flock or crop, making prevention, monitoring, and containment core production infrastructure rather than a peripheral agricultural issue.

The table's solutions focused on ownership and continuity. Build a farmers' coalition that includes major buyers; create lease-don't-sell structures that let distressed farmers retain title; develop agricultural-trades pathways through BOCES with farms providing the hands-on component; use milestone-based community capital; and expand working models before inventing new ones.

Automation was treated as necessary, not threatening. The labor is not available at the required scale. Drones, automated milking and quality systems, and processing technology are increasingly how farms remain economically viable.

The regional stakes extend beyond today's farm economics. Participants viewed the Great Lakes as increasingly valuable under long-term climate and migration shifts, making permanent loss of productive farmland a strategic decision rather than merely a local land-use choice.