Executive Summary

China is often portrayed as either unstoppable—dominating electric vehicles (EVs), batteries, and solar panels—or lacking the creativity to push the technological frontier. The United States is either celebrated as the unquestioned AI leader or criticized for losing its manufacturing base and becoming dangerously dependent on rivals. The reality is more complex—and more instructive.

In 2025, China made artificial intelligence (AI) progress under chip constraints, achieved breakthroughs in robotics and quantum computing, and weaponized its control of rare earth processing, yet it still cannot produce a certified jet engine or compete in high-end machine tools. The United States controls 90 percent of AI chip markets and produces far more advanced AI models than China, yet it has lost much of the manufacturing capacity needed to build at scale and depends on rivals for critical materials.

These patterns cannot just be explained by looking at research and development (R&D) budgets or patent counts. The answer is technological dexterity—the ability to build strengths across different technology types, where advantages in one domain compound advantages in others. AI chips enable AI models, rare earth processing enables chip manufacturing, and machine tools enable precision aerospace components. These technologies reinforce each other, but only when the right ecosystems support them.

The urgency is real: China has been playing the long game for decades—systematically building processing capacity in rare earths, scaling manufacturing ecosystems, and investing in the "missing middle" between lab and market—while the United States has too often lost focus on the ecosystem

foundations that make technological leadership durable. Success depends on whether America can rebuild these capabilities faster than China continues compounding its advantages.

Technological Dexterity Is the Strategic Imperative

Existing analyses benchmark technology capabilities at a moment in time—counting patents, models, or market shares. This report does something different: It identifies the underlying ecosystem drivers that determine who leads over time.

Technology leadership flows from ecosystems, not individual breakthroughs. Ecosystems are the dynamic combinations of firms, researchers, institutions, policies, and allied networks that turn lab discoveries into factory output and individual capabilities into networked advantages deployed at speed and scale. The report identifies four building blocks of ecosystem strength and uses them to identify the underlying drivers of U.S. and Chinese technology competitiveness:

1. **Economy-wide fundamentals**, such as macro stability, rule of law, and factor markets
2. **Technology-specific enablers**, such as R&D infrastructure, IP rights, standards, and workforce and talent pipelines
3. **Ecosystem governance**, such as public-private coordination and adaptive regulation
4. **Enterprise strategies**, such as innovation cycles, production networks, and intra-firm linkages

The report also identifies four distinct technology types based on two dimensions: breadth of application and production complexity. Achieving technological dexterity—building ecosystem strengths across multiple technology types—is the strategic imperative for the United States:

1. **Stack technologies**, such as AI and advanced chips, which require deep capital markets, collaborative research networks, and platform orchestration
2. **Precision technologies**, such as jet engines and lithography, which demand decades-long partnerships and gold-standard certification regimes
3. **Production technologies**, such as high-end machine tools, which need patient capital and continuous vocational training
4. **Base technologies**, such as rare earth elements (REEs) and batteries, as well as steel and aluminum, which require coordinated supply chains and processing infrastructure

The report compares U.S. and Chinese ecosystem capabilities in one illustrative technology from each category: AI, jet engines, machine tools and rare earth elements. It shows that each of these technology types requires different combinations of ecosystem building blocks.

Technology leadership flows from ecosystems, not individual breakthroughs.

Where America Leads, Where It Lags

The United States leads in Stack technologies—controlling 90 percent of AI accelerator markets and producing 40 notable models versus China's 15—and it leads in Precision technologies like jet engines, where decades-long moats create formidable barriers for new market entrants.[1] Despite sustained prioritization by Beijing, China still has no certified commercial jet engine in flight.

But China dominates Base technologies—processing 90 percent of rare earths and producing more steel than the rest of the world combined.[2] On Production technologies like machine tools, the United States has lost historical advantages, while China also remains unable to enter high-end tiers, where the European Union and Japan lead through dense supplier networks and continuous vocational talent cultivation.

Across technology types, the United States excels at frontier research but struggles with the capital-intensive engineering, testing, and scaling phase between lab and market—ceding learning curves to competitors who invest in this "missing middle." America's advantages rest on foundations that China struggles to match: open collaboration, institutional trust, global talent attraction, and capacity to orchestrate complex partnerships with allies. But vulnerabilities compound. America invents, but diffusion lags—limiting the payoff from its Stack leadership.[3] China dominates Base technologies thanks to its use of mercantile tools that have eroded Western capacity.

Ecosystem Building Blocks: No Absolute Advantages

Economy Wide Fundamentals (World average: 50)						
United States: 73 ↑			China: 55 ↑			
Building blocks / Tech-nology	**Tech-specific Enablers**		**Ecosystem Governance**		**Enterprise Strategies**	
	U.S.	China	U.S.	China	U.S.	China
Stack AI stack	Dominant ↑	Competitive ↑	Advanced →	Competitive →	Advanced ↑	Advanced ↑
Precision Jet engines	Advanced →	Lagging ↑	Competitive →	Emerging ↑	Advanced ↓	Lagging ↑
Production Machine tools	Competitive →	Competitive ↑	Emerging →	Emerging ↑	Emerging ↓	Emerging →
Base Rare earths	Emerging ↑	Dominant →	Competitive ↑	Dominant →	Emerging →	Advanced →

Trend of indicators: ↑ Improving → Stable ↓ Deteriorating

Qualitative scale:

Dominant | Advanced | Competitive | Emerging | Lagging

A Strategic Bind—And How America Can Break It

America is in a strategic bind: China deploys mercantile and malign tools, including below-cost dumping that bankrupts Western competitors, forced technology transfer, coercive licensing, predatory investment, and patient state capital that can tolerate prolonged periods of losses to capture entire supply chains. It is also producing genuine innovations—including world-first inventions—with increasing frequency. Meanwhile, America relies primarily on historical strengths—such as capital markets, universities, and the rule of law—without adequate tools to counter China's practices. Export controls and tariffs address symptoms but cannot substitute for building domestic and allied capacity.

The risks compound *daily*. Base technologies enable Stack technologies—without secure critical minerals inputs, chip design advantages become vulnerable to supply disruption. Production technologies determine scaling capacity—without machine tools, America cannot scale Stack or Precision technologies at home. China now threatens to do to Stack technologies what happened to Base technologies: capture commercialization and diffusion while America retains invention.

Breaking the bind requires building new capabilities: patient capital mechanisms where strategic necessity demands them, conduct-based trade tools that counter dumping and coercion without broad protectionism, allied coordination that pools resources and shares burdens, and institutional capacity to execute multiyear strategies across political transitions.

A Living Playbook That Works

To meet this challenge, the United States needs three self-reinforcing strategies:

- **Playing All the Keys:** America must develop technological dexterity by securing Base inputs, strengthening Production capacity through selective reshoring and allied networks, fortifying Precision technology moats without sheltering incumbents, and compounding Stack advantages through faster scaling and diffusion. To that end, the Trump administration and Congress should focus CHIPS Act science funding on Base and Production technology gaps—directing billions in research authorization toward time-bound commercialization grand challenges, especially where Chinese mercantilism has eroded Western capacity. They should also establish a Technology Dexterity Fund that would pool funding from the Departments of Defense and Commerce, alongside private American investors, and allied and partner capital to invest jointly in U.S. technology capabilities—sharing costs and deepening coordination that China cannot penetrate. The Defense Production Act should be deployed for Base technologies like critical minerals where patient capital requires government de-risking.
- **Achieving Speed and Scale:** The United States should move at the speed and scale that competition demands. It should impose permitting shot-clocks with enforcement teeth—rapidly cutting U.S. timelines for mining and infrastructure projects from decades to years, from years to months. It needs to break commercialization bottlenecks, where innovations die between lab and factory. The Department of Commerce should refocus Manufacturing

USA and similar programs on end-to-end pilot lines to rebuild shared engineering infrastructure and test datasets. Federal and state governments should launch sector-specific adoption accelerators targeting areas where diffusion faces the highest barriers; they should prioritize workforce development with portable credentials in desperately needed skilled trades such as electricians and technicians.

- **Defending the Network:** The United States should ramp up efforts to safeguard innovators, networks, and their innovations. It should lead and institutionalize a new multilateral regime that focuses on a broader definition of dual-use technologies. The Department of Commerce should establish dedicated "fast-action" teams specialized in high clockspeed industries and adversary reactions. The government should impose conduct-based import restrictions on below-cost dumping, coercive licensing, and predatory investment—not blanket sectoral bans. It should expand Committee on Foreign Investment in the United States (CFIUS) authorities, negotiate tech-friendly trade compacts, and create a central economic security capability for coordinating across government.

If 2025 delivered wake-up calls, 2026 demands action. Congress and the executive branch will either unify around technology leadership—or fracture into tariff wars and political skirmishes that squander the very advantages China cannot replicate. Public funding, for instance, under CHIPS and Science Act authorities, refocused today can enable targeted breakthroughs tomorrow, whereas inaction will see nascent U.S. technologies fail to scale thanks to the "missing middle." Early moves toward a Technology Dexterity Fund could build confidence among allies and supply chain partners—or the United States can wait and watch as allies hedge toward China. Permitting and related reforms at the federal and state level, enacted now, can turn infrastructure potential into deployed capacity—or projects envisioned today could languish until after 2050.

The United States must (1) "play all the keys" by developing dexterity across technology types, (2) make speed-to-scale the organizing principle for enabling infrastructure and technology diffusion, and (3) defend its networks of innovators at home and abroad against mercantile and malign threats.

The United States has rebuilt ecosystem advantages before—not through centralized direction, but coordinated action across public and private sectors. The Defense Advanced Research Project Agency's creation of the internet, the biotech revolution sparked by the Bayh-Dole Act, and rural electrification succeeded because the government, private sector, universities, and workers aligned. Americans are losing time. The question is whether the United States will reassert scientific, engineering, and manufacturing prowess, especially where it has lost ground, or whether it will continue to cede leadership.