

From Sovereign Yards to Shared Gardens:

Securing technological advantage through
collective economic security



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Dr. Lars Frølund's expertise lies at the intersection of mission-driven innovation, grant and venture capital investments into deep tech ventures, and building innovation ecosystems. Most recently, he was Special Advisor at NATO HQ for the creation of the Defense Innovation Accelerator for the North Atlantic (DIANA) – the world's first multi-sovereign venture capital fund. Formerly, he was Research Director, Visiting Fellow, and a Fulbright Scholar at the Massachusetts Institute of Technology (MIT) where he currently serves as a Lecturer. He is on the Board of Directors of the European Innovation Council (Europe's largest investor into deep tech ventures), the EIC Fund (the equity investment part of the EIC). Most recently, he served as Special Advisor for Digital and Technological Sovereignty to Margrethe Vestager, Executive Vice-President of the European Commission.

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We advocate for a shift from isolated national strategies (sovereign yards) in technology and innovation to a model of "shared gardens," whereby allied nations selectively collaborate in areas of critical technology to secure collective security. With the expanding set of strategically relevant technologies, no nation can sustain technological advantage alone. Instead, in select areas from quantum and space to fusion and semiconductors Europe, the United States, and close allies, e.g. Five Eyes countries and Japan, should identify complementary capabilities that together will enable a robust, shared future industrial base. This model of 'collective economic statecraft' will reduce dependence on non-allied powers more rapidly than any national sovereignty approach alone. We highlight the need for institutional frameworks to support shared gardens in different capability areas, building on existing organizations like NATO or new initiatives like AUKUS.

The Draghi report signals a significant shift in EU policy, one that mirrors that of the United States: a push towards greater economic security. Driven by a desire to lower strategic dependencies, the report is aligned with the Commission's ["Recommendation on Critical Technology Areas for the EU's economic security"](#) and most recently, proposed measures to monitor [investment risks](#). Meanwhile, the US has strengthened its industrial policies around critical technologies with the implementation of the Chips & Science Act and the Inflation Reduction Act, sought to [shape in and outbound investments in key](#) areas,

limit exports to China and put tariffs on Chinese imports. In response, China has continued to promote its strategic capabilities, [build up its Central Science and Technology Commission](#) and [restrict the export of Gallium and Germanium](#) (for use in semiconductors).

Putting science and technology at the top of the policy agenda signals a recognition that advanced technological capabilities - from the earliest stages of innovation through to scaled production across a resilient industrial base are the foundation of economic prosperity and national security. Not surprisingly, policy approaches in most capitals emphasize technological **sovereignty** and aim to strengthen and protect **domestic** capabilities. This perspective also drives nations to draw higher boundaries around their critical technological foundations: what the U.S. National Security Advisor has [referred](#) to this as building high fences around small yards.

However, the ever-expanding list of critical technologies makes it impossible for even the strongest nations to build advantage alone. A narrow national focus also limits opportunities to benefit from one of the essential drivers of economic growth - comparative advantage. And it can stifle growth opportunities by inadvertently limiting export opportunities. Instead, how can like-minded allies across Europe, as well as the UK and the US (along with further Five Eyes partners and Japan), build economic prosperity and national security i.e. economic security, collectively?

Europe and its partners must shift their emphasis towards international technological alliances promoting and protecting shared sovereign capabilities - an approach we describe as “shared gardens” (in counterpoint to national yards). Carefully constructed cooperation to secure collective technological advantage and a wider, more resilient industrial base is the next step in the logic of economic security laid out by Draghi and must be achieved through *collective economic statecraft*. This will create opportunities for smaller nations such as Denmark, Norway and Estonia with unique capabilities (in e.g. quantum, space and cyber) to contribute to collective sovereignty and at the same time overcome internal markets too small to support significant domestic strength across multiple technologies. Conversely, for the U.S. and other large blocs such as the EU, building shared gardens is a more resilient approach to building the industrial base that also strengthens and protects the economies of allies.

The calculus of collective economic statecraft is new and will rely on institutional infrastructure to support difficult conversations about relative technological strengths and weaknesses, and shared limitations in the industrial base. Partnerships among allies have traditionally served as the basis for military and security collaboration e.g. NATO or form the basis of economic partnership e.g. the

European Union. And, new configurations have emerged with an emphasis on defense, such as AUKUS and the recent [US-Japan relationship](#). New and existing structures can be expanded to serve as the institutional foundations for shared gardens that include critical technologies beyond the military domain. The creation of AUKUS Pillar 2 to catalyze [advanced capabilities](#) is a case in point. Building on Article 2 which commits to “encouraging economic collaboration” NATO’s approach to shared capabilities in [space and satellites](#) or [deep sea mining](#) and mineral extraction is leading the way.

Within shared gardens, there is a need to design shared fences. European and the US have traditionally welcomed global talent, global capital and tapped into global supply chains, especially for civilian technologies. But this open approach is changing: in a recent Five Eyes [statement](#), the domestic security chiefs articulated that **all** our technological organizations - supporting military and civilian economic advantage - are increasingly vulnerable to, and the target of, efforts by adversarial actors to acquire essential intellectual property. The increasing level of state threat arising from the contested geopolitical environment has thus put **protection** of capabilities alongside promotion of strengths high on the list of government priorities across a much wider horizon than ever before. A collective approach to protecting our technologies must build upon but expand our thinking beyond the [expansion of export controls](#) (such as the U.S. prohibition the export of [high performance computing chips to China](#)). And the role of allies should be more explicit in considering [national security investment in the UK or Norway](#). The decision to create an [AUKUS-wide ITAR “zone”](#) to enable collective protection within a larger shared garden by allowing for license-free defense trade is a clear example. Similarly, discussions around the Strategic Technology Investment Council between the US and UK signpost possible formats for protection of capital flows. Other informal approaches include the decision by the Netherlands - whose expertise in photolithographic equipment is essential to the most advanced generations of semiconductors - to limit exports to China in support of U.S. economic security priorities. Even though the nations had no formal institutional arrangements for interactions around technological capabilities and economic diplomacy, existing institutional infrastructure proved a useful context for action. But in every instance, these conversations must be undertaken with an appreciation of both technological issues and economic ones.

Well-protected shared gardens that provide *collective sovereignty* over technology are not a novel idea. In WWII the British [Tizard Mission](#) was a bold journey to share extraordinary advances in radar with the U.S. in hopes of protecting it from the advancing military threat and building a shared capability that could be deployed in pursuit of Allied victory. More recently, NATO Allies are sharing drone technology

with Ukraine and building real-time shared capabilities. Outside of wartime, a more consistent approach is needed to determine whether and under what conditions collective sovereignty is the answer. This requires us to consider two dimensions: dependency and vulnerability.

Dependency is the degree to which one nation requires another for its capability. For most nations (including the U.S.), independence is rare, especially when we consider the entire supply chain and beyond essential military capabilities. Instead, dependency comes through complementary expertise, geographic advantage and cumulative production advantages. Full-scale systems in quantum computing rely on expertise in key subsystems from magnetic tape to cooling systems that are likely to be spread across many nations suggesting that alliances are vital in this domain. Space launch depends upon geographic advantages so that the launch capabilities of nations like Norway at the [Andoya spaceport](#) will be essential to a shared garden for European space sovereignty that includes partners such as e.g. German rocket developer [Isar Aerospace](#). Similarly, geographic advantage in rare earth elements and a long tradition in mining formed the bedrock of Australia's [bilateral agreement with the European Union](#) which followed an announcement between [Australia and Canada on supply chain security](#). A third type of dependency comes from cumulative advantage in production - where years of investment mean that one nation is so far ahead of others that their role in a shared garden is essential: Taiwan's long-term extraordinary comparative advantage in semiconductors is a powerful exemplar ([with South Korea lagging by six months and the US further behind](#)) - and one the U.S. hopes to resolve through a shared garden approach.

Vulnerability is the second dimension to consider in a shared garden: which critical technologies are likely to be the subject of significant strategic control by adversaries leaving allies and partners strategically vulnerable (or vice versa). The ability to disrupt essential medicines (coming from abroad), to cut off energy pipelines or communications networks leaves allies vulnerable. The potential to disrupt critical systems through chip design (as was the concern with 5G network infrastructure) make supply chains (not simply the end technology) an essential point of vulnerability.

Shared gardens will be most important for critical technologies that can be weaponized by adversaries leaving individual nations vulnerable if they don't build shared gardens. The war in Ukraine has already highlighted key supply chain vulnerabilities in drone components. In the Covid-19 pandemic, vaccine production was vulnerable to technological capabilities (in designing mRNA vaccines) and key inputs including [lipid nanoparticles](#). In future decades, vulnerabilities may arise in fusion energy without

attention to fuel or material inputs, suggesting the need to design a shared garden today to avoid future vulnerabilities.

Pursuing economic security through shared gardens will face significant implementation challenges. In a policy arena designed for national advantage, which rarely blends diplomatic and techno-economic skills, there is no playbook for collective economic statecraft. As a starting point it means recognizing areas where countries have advantage because they excel (at a capabilities level, not in high-level lists of technologies). And, it means avoiding a desire to “level up” entire economies in every arena. Programs within a shared garden will have to avoid *juste retour* - the right of a country to receive from a program (garden) precisely what it puts in. The architects of shared gardens must also crowd-in resources from the private as well as the public sector with a recognition that one nation’s wealth might, at times, be better served strengthening a capability in a partner nation. More broadly, the new reality of collective economic security means that a wide set of organizations must be brought into the design and implementation of shared gardens.

The notion of high fences around small yards is a powerful starting point for sovereign nations to consider their technological advantage and economic security. But with the pace and scope of technological competition advancing comes an urgent need for sophisticated collaborative architectures that create shared gardens to support collective technological advantages. In these new configurations, groups of nations can work to pool, promote and protect shared sovereign assets to collectively promote technological and industrial strength. Taking these bold steps, partners stand to resolve one of the fundamental tensions that has beset discussions of national and economic security shifting from an either or - i.e. protect/national security versus promote/global competitiveness - to an architecture of collective economic statecraft where measures to promote and protect critical technology and the industrial base go hand in hand among partners.