Emerging US Industrial Policy Approaches

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The issue:

- The federal government has long avoided industrial policies outside of its defense sector.
- But it is now pursuing a series of new programs at a scale never tried before.
- Very complex task – hard to get this right
- This review sets out these new industrial policy programs, *and*
- Reviews the critical new infrastructure and operating mechanisms needed to make them work.

The backdrop:

- **Industrial policy: long history in the U.S.**
  - Start: Hamilton worked to spur an American manufacturing sector – tarriffs, defense, direct co. support; federal direct was dropped, tried in Patterson, NJ with state role
  - The defense sector has long applied industrial policy (aviation, electronics, space, nuclear power, computing, internet) - but interventions limited in other sectors.
- **Mainstream economists long opposed industrial policy approaches, favoring reliance on markets**
- **Definitional debates over industrial policy – what is it?**
  - Minimum: gov't intervention to achieve technology advance in stages of: research, development, testing, demonstration, financing, initial market creation
- **However, four earlier periods after WW2 of industrial policy development:**
  - Cold War –expanded DOD role, NASA, DARPA, etc.,
  - Competitiveness challenge with Japan (R&D tax credit, Sematech, MEP, Bayh Dole)
  - Energy technology initiatives starting in the 2000s, and
  - Advanced manufacturing efforts starting in 2012
- **Now major industrial policy programs are evolving at an unprecedented scale and magnitude – driven by China's tech advances and climate response**

Series of new industrial policies emerging:

- **The New Programs:**
  - **Operation Warp Speed** 2020-2021 – rapid vaccine development and production – guaranteed contracts to scale production, distribution system
  - **Semiconductors**: $53B for fabs/foundries, applied development
  - **Endless Frontier Act** – applied R&D directorate at NSF, Univ. Tech Centers, testing/demonstration, Regional Innovation Hubs - current and new R&D: $100B ($29B for 10 advanced tech areas – quantum, AI, etc.)
  - **Energy Demonstration Projects** – around $50B for climate: clean energy, renewables, electric vehicles, carbon capture and sequestration, advanced nuclear energy, hydrogen, batteries – in the infrastructure bill
  - **Secure supply chains** – June WH report - pharmaceuticals, semiconductors, critical minerals/materials, advanced batteries – network of interventions
  - **House Reconciliation bill – applied programs -** *energy***:** $150B in "clean electricity" for 80% utility emissions reductions, *health***:** $3B ARPA-H, $15B disease preparation/public health areas; *space***:** $4 NASA infrastructure, *NIST***:** MEP $1B, $850m adv'd mfg., $150m semiconductor mfg. innovation

Innovation Framework : Examining the U.S. Industrial Policy System - Pillars, Processes, Gaps

- **US - Current Innovation Pillars:**
  - R&D – basic across group of science agencies; applied in DOD, DOA
  - Applied technology development – defense dominated
  - Staffing the innovation system: Education – engineers and scientists – strong/ technician training weak
  - VC support for software and biotech, but not for “hard tech”/mfg.
- **Processes:**
  - Basic R&D agencies focused on research only – disconnected system
  - Industry has the applied role, without gov’t involvement, except in defense technologies
- **Gaps:**
  - Applied support (except Defense role)
  - Scale-up support except in certain fields (software, biotech)
  - Financing for technology scale-up
  - Demand/market creation
  - Supply chain connectedness
  - Manufacturing technology leadership

Need new infrastructure to support oncoming industrial innovation policies:

- *Current system not ready to manage industrial policy (outside DOD) – need new operating mechanisms/infrastructure*
  - Talent fluent with applied development, demonstration, scaleup
    - We don't have this except at DOD
    - Weak system for training the technical workforce – need change agents
  - "Connected Science" – need research linked closely to development, scale-up
    - Agencies disconnected from the applied side (except at DOD) – need basic/applied continuum
  - Rebuild manufacturing foundations – advanced manufacturing
    - Productivity stagnation in industry and rising deficit in advanced technology goods - $190B
    - Advanced manufacturing programs systematically underfunded – not fixed in pending programs
    - 16 Manufacturing Innovation Institutes - $200m/year in $1.2T mfg. sector
    - Can't fix supply chains without strong manufacturing underpinning
  - Mapping supply chains, filling gaps
    - Can't fix supply chains unless we map them – even DOD is weak on this past the 2nd tier
  - Technology Testing and Demonstrations
    - Key industrial stage but no system outside of DOD – major past weakness for energy technologies

Building the Infrastructure/Operating Mechanisms, continued

- Integration between agencies, industry, universities
  - Industrial polices require these linkages
  - Also, cross-agency collaboration is a system weakness
- Technology certification and validation
  - FDA operates as a new technology validator/certified – no system outside health sciences
- Flexible contracting mechanisms (Def. Prod. Act, OTA)
  - Federal procurement system for innovation – broken in Defense and non-defense areas
  - Need wider use of guaranteed contracts based on results (OWS), DPA, OTA
- Financing (lower cost scale-up for production)
  - Supply chain resiliency /SMEs require for advanced mfg. technology/equipment
  - Sen. Coons financing agency bill left out of reconciliation; give EXIM domestic lending power?
- Government Procurement – demand side, initial market creation
  - Creating the initial market for innovations - tool DOD has long applied (computing, aviation, space, nuclear, CNC equip.); need in energy fields for climate – and use in other new tech areas

Without the right infrastructure/operating mechanisms…

the Administration's suite of new technology programs,
for competition with China and climate change, faces major hurdles