



# THE NATURE OF POWER: A METCALFE'S LAW NATIONAL SECURITY STRATEGY

By James Sullivan

## **ABSTRACT / SUMMARY**

Comments from government officials, inclusive of United States Treasury Secretary Janet Yellen and European Union Central Bank President Christine Lagarde, clearly indicate the potential end of the “Washington Consensus” around global free trade and the potential for regime change. At the same time, peer competitors such as the People’s Republic of China actively discuss “changes not seen in a century” and a goal of global leadership by 2049. Both of these facts require a discussion and reanalysis of the basis of power in the international system.

Conventional wisdom holds that centralized power within an authoritarian system provides a structural competitive advantage in whole-of-society competition. This paper refutes this, showing that Metcalfe’s Law implies that the many interconnected nodes in a decentralized system (such as a democracy) drive an exponential power advantage. United States national security strategy must be centered around the concept of distributed network advantage. This paper makes specific recommendations towards its application across innovation, economics, diplomatic and military efforts.

## **ACKNOWLEDGEMENTS**

Douglas Greenlaw, Vice President of Strategic Growth, Research Innovations Incorporated

### INTRODUCTION

The hyperbolic statement that the world is at a crossroads is true, but not in the way it is popularly understood.

Peer competitors to the United States, such as the People's Republic of China (PRC), talk about “changes not seen in a century” and describe this crossroad as an opportunity to change the nature of the international order (习近平接见 2017 年度驻外使节工作会议与会使节并发表重要讲话-新华网, 2017). Their proposed order devolves power across multiple players and spheres of influence, with a new set of rules that enshrine power, rather than universal values, at the core of the system.

This paper argues that the world does sit at a crossroads, but one where the nature of power can be better understood in ways that *strengthen* the competitive position of the United States and western democracies. Much has been made of the rise of China, the return of Russia, and the potential for an alternative authoritarian model (Lemke & Tammen, 2003). These risks can be minimized, however, if the United States strategy recognizes and leans into the correct definition of the nature of power in the international system.

### DEFINING THE NATURE OF POWER

Centralized control inherent in most authoritarian systems is seen as a structural advantage in whole-of-society competition (Sullivan, 2021). This drives an argument that authoritarian systems can replace democratic ones as the core driver of the global order (Chen, 2013). The PRC, for example, can centrally organize government, military, academic, and commercial efforts in unison. Democracies, driven by notions of separation of powers, private sector rights, and civil freedoms are seen as facing a dilemma. They must either sacrifice the rights that sit at the core of their systems or recognize that they are incapable of competing in a whole-of-society arena (Dowse & Bachmann, 2019).

This is a false dichotomy as it carries forward a flawed definition of power. A centrally controlled state may indeed be better at short-term execution of defined tactics. Central control and a unified power infrastructure reduce internal friction, minimizing intra-bureaucracy coordination and communication issues. It can drive faster decision-making and faster execution of decisions (Haozhe, 2015).

The world, and power, are governed, however, not by speed, but by insight and innovation. Insight and innovation are then in turn driven by debate and internal conflict and diversity of views and opinions. These are not the core advantages of an authoritarian system. Indeed, such systems can be seen to be incapable of their pursuit.

This understanding must rest at the core of US security strategy. It must rest at the core as it has driven US power since the nation's inception. It must rest at the core as it is a strategy that authoritarian powers cannot replicate or counter over the long term.

It is not a coincidence that the authoritarian powers currently seen as "rising" lack both innovation-driven economies as well as meaningful alliance structures.

### **A METCALFE'S LAW NATIONAL SECURITY STRATEGY**

Metcalfe's Law states that the power of a network is proportional to the square of the number of connected users (Kocovic, 2008). This is a useful way to think about the scaling benefits of networks but also illustrates the fundamental weakness of a model where all meaningful connections originate from the center.

This paper argues that global power originates in innovation & insight, which drives technology, which drives the economy, which results in diplomatic and military strength. The implications of a Metcalfe's Law approach to each of these areas will now be considered.

## INNOVATION & INSIGHT POWER

The United States was or is home to 400 Nobel Laureates (World Population Review, 2022). Great Britain comes in second with 138. Russia, inclusive of the Soviet Union, comes in far lower with only 32 since 1901. China? 6. Clearly, there is scope for a debate regarding relative levels of economic development, among other factors. This paper, however, argues that innovation is a function of structure as much as of economic development.

The fact that the power of the atom was unlocked in the United States was driven by structure, by a society willing to accept internal conflict and divisive ideas, and one that was willing to accept them from all comers inclusive of the best minds from foreign shores. Insight and innovation are a function of decentralized networks of competing ideas. This concept is even being carried forward into advanced computing as generative adversarial networks (GAN) position two neural networks to compete against each other on a task to drive a better outcome than what one alone could achieve (Hong et al., 2019).

United States National Security policy must recognize this fact and take several specific steps to operationalize this idea. First, seed funding for basic research must be considered a national security priority. Second, policies must be created which allow for significant mobility across academia, government, and military positions to bring the best minds to bear on the most important problems. Government and military organizations are increasingly at a steep competitive disadvantage in recruiting and retaining the best technical and scientific talent in an age where private interests can offer multiples of the compensation available. Greater mobility can also help to break down some of the current cultural and organizational barriers that exist between the private sector (particularly in the technology space) and government service. Third, and perhaps more controversially, the United States should continue to attract the best academic minds from overseas and provide greater avenues for them to stay in the United States post-graduation. The lead scientist on the Manhattan Project was the son of German immigrants, and forty-five percent of Fortune 500 companies were started by immigrants and their children (New

American Economy, 2019). Metcalfe's math works regardless of the original nationality of the "connected user".

## **ECONOMIC POWER**

A country's economy is the core of its ability to provide a better life for its people, to develop and fund social services, and ultimately to create the means by which to pursue military activities (Beckley, 2018; Mearsheimer, 2014; Nye, 2011). It can also be a vehicle for conflict directly, as seen in economic warfare strategies deployed by the United Kingdom prior to World War I, by the United States prior to its entry into World War II, and the recent rise of economic sanctions as a tool of modern warfare (Lambert, 2012; Miller, 2007). United States National Security policy should focus on at least three ways to scale economic power.

First, policy must take a balanced view of globalization and trade, particularly regarding core technologies. The current move towards onshoring and nearshoring has a place but cannot be taken to an extreme. Global trade networks offer not only efficiency but also power, in line with Metcalfe's law. These networks should therefore be kept as large as possible while recognizing the new global strategic reality, in line with recent comments from Treasury Secretary Yellen and European Central Bank President Lagarde (Lagarde, 2022; Olson, 2022; Yellen, 2022).

One example can be seen in the global semiconductor industry. The current approach, which appears popular in Washington, D.C. today, is to onshore as much capacity as possible (Biden, 2022). An alternative approach, designed to maximize the number of "connected users" in the system and therefore maximize efficiencies and insights, would be to recognize the value of a network distributed across allies while at the same time creating required redundancy in the system. Much has been made of the fact that China now has over 15% of the global semiconductor wafer capacity (Thomas, 2021). This is dwarfed, however, by the United States and its allies at over 75% of global capacity (Rosso, 2022). United States policy should focus on strengthening insight sharing and reducing trade frictions within this network of

allies rather than focusing on entity and exclusion lists. United States policy should explicitly focus on the fact that while China has sprinted forward in replicating lower complexity chip production, they are still far behind in the marathon of advanced insight in chip design. The United States needs to win the strategic marathon, not the tactical sprint.

Second, trade networks are another source of Metcalfe-ian advantage. The United States should pursue mutually beneficial trade agreements with as many nations as possible. Clear messaging will be required to present these trade agreements as core tools of national security to turn the tide of negative domestic opinion regarding trade agreements. The PRC has clearly recognized the importance of trade networks, particularly in their near abroad where they are seeking to build a defined sphere of influence(Luo & Zhang, 2010). They have taken advantage of United States' withdrawal from the then Transpacific Partnership and have now formally applied for membership into the Comprehensive and Progressive Agreement for Transpacific Partnership. The United States must re-engage so as not to allow the PRC to leverage Metcalfe-ian network strength in its absence.

Third, care should be taken to continue to strengthen the significant network advantages inherent in the global financial system. SWIFT, with its more than 11,000 institutions, continues to exhibit massive scale advantages over the Chinese-led alternative CIPS network with fewer than 1,200 institutions(SWIFT, 2022). This and other associated clearing and settlement mechanisms must be considered core to US power, along with the centrality of the US dollar to the global financial system. Explicit steps should be taken to maintain the centrality of these systems as a core pillar of United States national security.

### **DIPLOMATIC AND MILITARY POWER**

The United States has over 50 collective defense agreements, spanning almost half the globe (Goldgeier, 2019). These are not “entanglements” but rather a critical source of strength in an interconnected world. Competitors such as the PRC and Russia have no such alliance network and, indeed

in the case of the PRC, have long-standing policies to avoid them (Chaudhri, 1986). The United States must continue to take the type of multi-lateral approach pursued regarding the recent invasion of Ukraine.

## RECOMMENDATIONS

United States National Security strategies must be based on three strategic pillars that increase network effects by eliminating seams across the spectrum of competition and conflict.

First, the system envisioned must be based on the idea that constant aggressive competition is the norm. This competition may at times move into kinetic conflict but exists at aggressive levels even during periods of “peace.” Departmental structures and policies must no longer distinguish between “competition” and “conflict,” as this is a false dichotomy in the modern world.

Second, the system must recognize that adversaries compete across all aspects of society (e.g., PRC’s “civil-military fusion” or *San Zhong Zhanfa*) and therefore requires a whole-of-society strategy (Weinstein, 2021). Critically, however, this whole-of-society positioning must recognize the primacy of decentralized networks as a core strength of the United States system, alongside the value of competing ideas. This dialectic sits at the core of the system and is of critical importance.

Third, the system must leverage global strength and alliances rather than divide into regions. The regional Combatant Command separation and lack of integration with allies must be overcome, leveraging globally integrated operations and strategies.

Throughout the above, the strategy must recognize the “messiness” of a democratic system is a feature, not a bug. It is indeed a key driver of its strength and resiliency. Maximizing independent connections both within and without the system is a critical driver of success in the strategy marathon, even at the expense of relative weakness in the tactical sprint.

A new National Security strategy must also be based on three organizational pillars.

First, there must be a balance between institutionalization and informality. Previous revisions to the National Security Act in practice and form show this dichotomy. Eisenhower's "Policy Hill" and process-based approach was designed to eliminate departmental bias, ensure long-term thinking and competing views; but the significant bureaucracy it created led to the Jackson Subcommittee and Kennedy reforms designed to increase flexibility (Nelson, 1983; Newmann, 2015).

Second, attention must be paid to the role of accountability to allow operational flexibility and to address clear public concerns regarding abuses inherent in a system requiring confidential information and actions. All systems and processes should maximize accountability through oversight committees and required notifications prior to certain actions.

Third, a Metcalfe-based system with its squaring of impact with each new "connected party" fails if there is a lowest common denominator debate where parties are protecting parochial interests or are afraid of offending superiors. Indeed, one of the greatest weaknesses of authoritarian systems is the collapse over time of the network of advisors around the central power in the system and their ability to speak truth to power.

### **POTENTIAL REORGANIZATION**

Conway's law argues that the output of an organization will be determined by its structure (McManus, 2019). This implies that the organizational structure of the United States National Security system must be designed with a recognition that a) innovation drives technology, which drives the economy, which drives diplomatic & military strength; and b) we are engaged in a whole-of-society continuous competition with at least one peer competitor who is explicitly seeking to lead the world order by 2049 (Yang, 2020).

The impact of organizational structure on operational delivery has already been clearly recognized in the US military. This was initially seen in efforts to integrate the various services through the introduction of the Chairman and the Joint Chiefs in the original National Security Act of 1947, as

well as the subsequent creation of Combatant Commands assigned to the Secretary of Defense in 1953. This concept can be extended further to incorporate both civilian as well as military resources. Private sector and academic resources must be included on a partnership basis in this new construct to maximize the number of relevant “connected parties” and globally integrated operations must be the norm.

New legislation should consider a holistic approach to combining critical functions that currently sit across the US bureaucratic structure.

While a Department of Innovation sounds slightly Orwellian, critical capabilities that currently sit across the Department of Commerce, Department of Defense (which alone spends close to 50% of the total United States Government Research and Development budget), National Institute of Health, National Science Foundation, Departments of Energy and Agriculture, NASA and others (Sargent, 2021). There would be scope for an overall board if not a department focused on serving as a central node of innovation planning and investment. This node would critically not control overall spending but could prioritize across the United States Government and serve as a critical partner for private and academic players. A step in this direction has been taken with the National Science Foundation standing up the Directorate for Technology, Innovation, and Partnerships (*NSF Establishes New Directorate for Technology, Innovation and Partnerships*, 2022).

A Department of Competition could serve as a critical clearinghouse for all elements of a whole-of-society approach to continuous competition. Capabilities that currently sit across Treasury, State, Defense, Intelligence Community, and others are all required to mount a consistent competitive front across economic, informational, technical, and kinetic phases of competition.

## **IMPEDIMENTS**

The paradigm shift described above along with enabling restructuring of large departments within the US Government will directly challenge established interests with significant constituencies. This shift and these changes will require strong buy-in and leadership from the White House alongside bipartisan leadership from Congress if enabling legislation is to survive attempts to preserve the status quo.

It will also require strong messaging to the American public. A Metcalfe approach to power has always been a critical driver of US strength. The rapid growth of both the volume and velocity of technological change, however, requires a renewal of vows, so to speak, to this approach to power generation. The United States has built its place in the world, and can continue to lead by leveraging the values at the core of our system, values that authoritarian systems cannot exercise. It is time to recognize the cacophony of the democratic system as its biggest strength and as a driver of power in the world.

## BIBLIOGRAPHY

Beckley, M. (2018). *Unrivaled Why America Will Remain the World's Sole Superpower*.

Cornell University Press, Project MUSE.

Biden, J. (2022, January 21). *FACT SHEET: Biden-Harris Administration Bringing*

*Semiconductor Manufacturing Back to America*. The White House.

<https://www.whitehouse.gov/briefing-room/statements-releases/2022/01/21/fact-sheet-biden-harris-administration-bringing-semiconductor-manufacturing-back-to-america-2/>

Chaudhri, G. (1986). *China and non alignment*.

<https://search.proquest.com/docview/36989315?pq-origsite=primo>

Chen, J. (2013). *A middle class without democracy: Economic growth and the prospects for*

*democratization in China*. Oxford University Press.

Dowse, A., & Bachmann, S.-D. (Dov). (2019, June 17). *Explainer: What is “hybrid warfare”*

*and what is meant by the “grey zone”?* The Conversation.

<http://theconversation.com/explainer-what-is-hybrid-warfare-and-what-is-meant-by-the-grey-zone-118841>

Goldgeier, L. W. F. and J. (2019, December 17). *Who are America's allies and are they paying*

*their fair share of defense?* Brookings.

<https://www.brookings.edu/policy2020/votervital/who-are-americas-allies-and-are-they-paying-their-fair-share-of-defense/>

- Haozhe, W. (2015). Completion of the restructuring of China's coast guard administration: Challenges and opportunities. *World Maritime University Dissertations*.  
[https://commons.wmu.se/all\\_dissertations/491](https://commons.wmu.se/all_dissertations/491)
- Hong, Y., Hwang, U., Yoo, J., & Yoon, S. (2019). How Generative Adversarial Networks and Their Variants Work: An Overview. *ACM Computing Surveys*, 52(1), 1–43.  
<https://doi.org/10.1145/3301282>
- Kocovic, P. (2008). FOUR LAWS FOR TODAY AND TOMORROW. *Journal of Applied Research and Technology*, 6(3), 133–146.  
<https://doi.org/10.22201/icat.16656423.2008.6.03.504>
- Lambert, N. A. (2012). *Planning Armageddon: British economic warfare and the First World War*. Harvard University Press.
- Legarde, C. (2022). *A new global map: European resilience in a changing world*.  
<https://www.ecb.europa.eu/press/key/date/2022/html/ecb.sp220422~c43af3db20.en.html>
- Lemke, D., & Tammen, R. L. (2003). Power Transition Theory and the Rise of China. *International Interactions*, 29(4), 269–271. <https://doi.org/10.1080/714950651>
- Luo, C., & Zhang, J. (2010). China Trade Policy Review: A Political Economy Approach. *World Economy*, 33(11), 1390–1413. <https://doi.org/10.1111/j.1467-9701.2010.01322.x>
- McManus, J. (2019). Conway's Law: A Focus on Information Systems Development. *ITNow*, 61(4), 50–51. <https://doi.org/10.1093/itnow/bwz112>

- Mearsheimer, J. J. (2014). *The tragedy of great power politics* (Updated edition.). WWNorton & Company.
- Miller, E. S. (2007). *Bankrupting the Enemy: The U.S. Financial Siege of Japan Before Pearl Harbor* (1st edition). Naval Institute Press.
- Nelson, A. K. (1983). The “Top of Policy Hill”: President Eisenhower and the National Security Council. *Diplomatic History*, 7(4), 307–326. <https://doi.org/10.1111/j.1467-7709.1983.tb00397.x>
- New American Economy. (2019). *New American Fortune 500 in 2019*. New American Economy. <https://data.newamericaneconomy.org>
- Newmann, W. W. (2015). Searching for the Right Balance? Managing Foreign Policy Decisions under Eisenhower and Kennedy. *Congress & the Presidency*, 42(2), 119–146. <https://doi.org/10.1080/07343469.2015.1030800>
- NSF establishes new Directorate for Technology, Innovation and Partnerships. (2022, March 16). [https://www.nsf.gov/news/news\\_summ.jsp?cntn\\_id=304624](https://www.nsf.gov/news/news_summ.jsp?cntn_id=304624)
- Nye, J. S. (2011). *The future of power* (1st ed.). PublicAffairs.
- Olson, S. (2022, May 4). *Yellen, Lagarde, and the death of the global trade system*. Hinrich Foundation. <https://www.hinrichfoundation.com/research/article/sustainable/yellen-lagarde-global-trade-system/>
- Rosso, D. (2022, January 10). *China's Share of Global Chip Sales Now Surpasses Taiwan's, Closing in on Europe's and Japan's*. Semiconductor Industry Association.

<https://www.semiconductors.org/chinas-share-of-global-chip-sales-now-surpasses-taiwan-closing-in-on-europe-and-japan/>

Sargent, J. (2021). *Federal Research and Development Funding: FY2022*. Congressional Research Service. <https://crsreports.congress.gov/product/pdf/R/R46869/3>

Sullivan, J. (2021). *The Ultimate Social Network: China's Expansionary, Internationally Oriented United Front Strategies 1923-2020* (SSRN Scholarly Paper ID 3832387). Social Science Research Network. <https://doi.org/10.2139/ssrn.3832387>

SWIFT. (2022). *SWIFT history*. SWIFT - The Global Provider of Secure Financial Messaging Services. <https://www.swift.com/about-us/history>

Thomas, C. A. (2021, January 7). Lagging but motivated: The state of China's semiconductor industry. *Brookings*. <https://www.brookings.edu/techstream/lagging-but-motivated-the-state-of-chinas-semiconductor-industry/>

Weinstein, E. (2021). China's Military-Civil Fusion Is Incomplete but Dangerous. *Foreign Policy*. <https://foreignpolicy.com/2021/02/05/dont-underestimate-chinas-military-civil-fusion-efforts/>

World Population Review. (2022). *Nobel Prizes by Country 2022*. <https://worldpopulationreview.com/country-rankings/nobel-prizes-by-country>

Yang, J. (2020). 积极营造良好外部环境（学习贯彻党的十九届五中全会精神）. *Actively Create a Good External Environment (Study and Implement the Spirit of the Fifth Plenary Session of the 19th Central Committee of the Party)*.

[http://paper.people.com.cn/rmrb/html/2020-11/30/nw.D110000renmrb\\_20201130\\_1-06.htm](http://paper.people.com.cn/rmrb/html/2020-11/30/nw.D110000renmrb_20201130_1-06.htm)

Yellen, J. (2022, April 13). Transcript: US Treasury Secretary Janet Yellen on the next steps for Russia sanctions and “friend-shoring” supply chains. *Atlantic Council*.

<https://www.atlanticcouncil.org/news/transcripts/transcript-us-treasury-secretary-janet-yellen-on-the-next-steps-for-russia-sanctions-and-friend-shoring-supply-chains/>

习近平会见 2017 年度驻外使节工作会议与会使节并发表重要讲话-新华网. (2017). 2017

CCP Diplomatic Envoy Working Conference.

[http://www.xinhuanet.com/politics/leaders/2017-12/28/c\\_1122181743.htm](http://www.xinhuanet.com/politics/leaders/2017-12/28/c_1122181743.htm)



*The views expressed in this article are the author's alone, and do not necessarily reflect the official position of the DKI APCSS or the United States Government.  
June 2022*