

THE MYTH OF NATIONAL AI STRATEGIES

HOW DO COUNTRIES DECEIVE THEMSELVES INTO
BELIEVING THEY HAVE NATIONAL AI STRATEGIC PLANS?

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As I was asked to review it, the ministry officials of a powerful Asian country boasted about their nation's artificial intelligence (AI) strategy. They were put in charge of developing an AI strategy for their country. With the help of US/UK based consultants, who were diaspora of that country, they developed the national AI strategy. The strategy, if viewed by a nonexpert, looked extremely reasonable. It had all check-the-box core elements that could be found in AI strategies developed by the United States, UK, EU, and other developed countries. In fact, it looked flawless – as it was clear that most likely the strategy developers scanned the AI strategy documents of several developed nations and then culled out specific strategic frames from them, synthesized them, repackaged them, and stamped the name of the client country on the new document.

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For an expert, however, it was clear that the proposed strategy was nothing more than a meaningless collection of vocabulary and vague aspirations that, metaphorically speaking, trespassed over the sacred space of a true strategy document. It was never a strategy to begin with.

They are not alone. I have observed the same problem in dozens of countries. From South America to (East and West) Asia to Africa and Europe, countries are rushing to develop and present their AI strategies without having any idea what a national AI strategy is or needs to be.

Since the beginning of the AI revolution, this copy/paste strategy development has become all too common. Consulting firms have mastered the art of adapting strategic frames developed in one country and rebranding them as national strategies for another country. In this paper I outline the major problems with this approach. This approach for strategy development is detrimental for the progress of nations. As I suspected, despite the so-called flawless strategy, the country described in the opening paragraph made absolutely no progress in AI or any of the areas that AI could have transformed. The economic, social, and political crises in the country worsened, its cybersecurity readiness declined, and its global competitiveness plummeted. So much for the AI strategy!

To develop real AI strategies, countries need to think differently. This is true for most countries – including the United States. For nearly six years, the US National AI

strategy was also composed of such meaningless aspirations. What was supposed to be a research funding strategy somehow became the grand AI strategy for the United States. Developed by AI professors and government officials, and later polished by consulting firms and enshrined by policymakers, the strategy turned out to be completely ineffective to drive the AI momentum. It was initially developed under the outgoing Obama Administration and then expanded under the Trump and Biden administrations. In 2022, as the primary author of a book titled “*At the Speed of Irrelevance*”², I highlighted the problems of the AI strategy – and how it led to the decline in the competitive potential of the United States against China. The book attracted the attention of various US government leaders who requested my guidance on how to develop proper strategic plans and I provided the requested guidance, which was taken into consideration and adjustments were made. The US strategy now looks significantly better, although it can still improve.

In this paper I will explain the issues with the existing so-called strategies and strategic plans. While rich countries, like the United States, can make mistakes in their AI strategies, their virtually unlimited capital and well-established capabilities can help them get back on track. In other words, they can quickly readjust their course and to some extent they can afford to make mistakes. But for

² Naqvi, A. and Janakiram, M., 2022. *At the Speed of Irrelevance: How America Blew Its AI Leadership Position and How to Regain It*. John Wiley & Sons.

smaller countries, things are different. Their margin of error is extremely thin.

AI has imposed a massive burden upon all countries: make progress or become irrelevant. Never before has humankind confronted a technological change of this scale where both physical and cognitive elements of work are getting automated and productivity potential can increase exponentially. This will create a tremendous differential between those who master and adopt this technology and those who don't. The scale of advantage implies that the leading AI nations will create such an immense competitive advantage that the laggards will face existential and sovereignty crises. To survive in this new world, lagging nations will have to surrender their sovereignty. AI is about to become an existential threat – but not in the ways Sci-fi shows it. Not pursuing AI strategically will become the greatest threat to a country.

POPULAR PATTERNS OF AI NATIONAL STRATEGIES

AI National strategic plans have become all too common. Nearly every country is now developing or has developed an AI strategy. These strategies are now beginning to acquire a general pattern. Their general blueprint is composed of the following:

AI as a national capability: The strategic plans usually recognize that AI is a major change for humankind and a critically important capability area for a country. AI is viewed as a major opportunity and a threat.

AI needs responsible adoption: After clarifying the above, the plans then quickly jump to reveal the sinister and evil side of AI and they caution against all the perils of AI including bias, prejudice, coldness, lack of humanity, privacy invasion, and cybersecurity vulnerability, among many others. In the wrong hands, we are reminded, AI can be a lethal and devastating weapon. To overcome those concerns, various types of AI ethics, AI governance, and AI management programs are suggested. The typical term used is Responsible AI.

Datasets and their availability: The plans then acknowledge that datasets must be identified, curated, and managed. They inform us that to propel innovation, reliable quality data should be made available to firms of all sizes. National programs call for the creation of such datasets.

Research funding: The plans call for dedicated research funding to drive AI research. Some plans recommend connecting universities and establishing specialized research centers. Others recommend guided research funding for various areas of AI research. Developing research agendas and shared goals is encouraged. Public, private, and academic partnership is encouraged.

Schools and training reskilling: The plans also emphasize the need for retraining and reskilling people. Some plans call for launching massive training programs in universities, colleges, and schools. Others recommend that students as young as in elementary schools should be exposed to programming.

Business incentives: The plans called for business incentives for companies that research and develop AI. Some call for building dedicated startup ecosystems and capital guidance programs. Others recommend having special tax statuses for AI firms.

Public, Academic, Private partnership: Nearly all strategic plans recommend building new alignments and partnerships between public, private, and academic entities.

Major sectors: The plans tend to focus on sectors – such as healthcare, finance, and manufacturing. Many call for developing sector-level strategies.

Government adoption: Both to incentivize the AI industry and to modernize government processes, AI adoption in government agencies is encouraged and recommended. Government agencies are also advised to create incentives to procure products and services from new and innovative firms that develop AI products and services.

The above is what is being touted as a general pattern of strategy. In addition to this overly simplistic and naive blueprint, the political will and orientation of many nations to

formulate AI strategies is driven by a need to show off and brag about their technological progress.

In some cases, leaders are pursuing it because they have heard that other countries are doing it. In my meetings, many leaders who wanted to embrace the AI revolution were not able to describe why they wanted their countries to have robust AI programs.

Others are doing it for an ostentatious display of technological leadership with an intense desire to be taken seriously in the world. After all, AI is a fascinating technology and having some shiny robots wheeling through a shopping mall, or some bots creating music and singing songs at a concert, can give the impression of technological progress. But that is not progress. These fancy little consumer-pleasing applications are not what will drive progress for nations. For that to happen countries need to have a serious AI based industrial, social, political, economic, and defense strategy. That is what makes a difference but that is also what is hard to achieve. It requires countries to think strategically.

THE PROBLEMS OF STRATEGIC THINKING

A strategy is not a document of intent. It is also not a supercluster of wish-lists, or an allotment of tactics carefully woven to form a bouquet of tasks. It is not linearly and neatly

lined pieces of domino, where once the first piece is pushed, the rest will diligently fall in causal order. It does not come with Aladin's lamp where wishes come true miraculously. There are many models of strategy and there are several ways to teach it.³

To develop a strategy, one must first understand what a strategy is and what is its role in achieving objectives. Then one must determine the nature of objectives for which a certain strategy is being developed. The mismatch between the nature of objectives and strategic thinking can lead to substandard strategies. One must also clarify the difference between policy and strategy.

All of that begins with first determining what AI is and what type of objectives should be tied to AI. AI is a fundamental change in how humans think, produce knowledge, and perform work.

Human work results from overcoming survival related challenges that life imposes upon humans. Humans must work to increase their survival likelihood. The work performed is a function of human thinking and knowledge production capabilities. If human survival is threatened by the same threat at two different locations, the response of the respective populations at each location will depend upon their thinking and knowledge production capabilities. For example, the recent example of combatting Covid shows that

³ Gray, Robert C. The Study of Strategy: A civilian academic perspective, Chapter 3 in report Teaching Strategy: Challenges and Response, Editor: Marcella, Gabreil, 2010, report published by Strategic Studies Institute of U.S. Army

nations that had thought about a methodical and systematic way to find cures for diseases had set up mechanisms to develop vaccines. Some of those nations established knowledge production capabilities to invent a vaccine. Covid was a threat to survival, however, many nations had not thought about developing capabilities to combat diseases by developing vaccines. They either couldn't develop that strategic thinking due to their circumstances, such as wars or poverty, or did not have that orientation. When nations don't think strategically, they do not take the next step of developing knowledge production capabilities.

Knowledge production is different than strategic thinking. Strategic thinking only makes one aware of the deficiency or paucity of knowledge in a specific domain. Not everyone who possesses such awareness pursues knowledge production. Knowledge production is a systematic process of discovery via research and following the scientific process. Once nations produce knowledge, they can then turn that into work outcomes by applying that knowledge in the form of products and services consumed by humans.

This forms a three-step process where strategic thinking leads to knowledge production and knowledge production to work outcomes. The beauty of AI is that it dramatically increases the power of each of the three steps. It enables a new level of strategic thinking with significant speed and depth. Ideas can be explored in several dimensions and analyzed through many different lenses. AI is also revolutionizing knowledge production by decoupling

knowledge production from the standard scientific process and allowing discovery in ways where knowledge outcomes precede theory. In other words, we know the right answers but don't understand the underlying theory. This reversal of direction in knowledge production, when combined with standard knowledge production methods, is creating explosive new knowledge. For example, it took humans 800 years to discover 48,000 energy stable inorganic crystals, but with DeepMind's research 2.2 million were discovered with over 330,000 stable crystals. This is six times more knowledge produced in 1/800th timeframe. ⁴

By transforming strategic thinking and knowledge production, AI is also unleashing a tremendous productivity improvement via simple automation in work processes. This automation is happening in both digital and physical robotics.

Hence, the goal for strategy development is to create a healthy national process flow that spans across the progress chain of *thinking > knowledge production > work output* resulting in explosive productivity. This means to radically transform, boost, and invigorate strategic thinking, knowledge production and work output capacities such that nations experience order of magnitude improvements.

⁴ Merchant, A., Batzner, S., Schoenholz, S.S., Aykol, M., Cheon, G. and Cubuk, E.D., 2023. Scaling deep learning for materials discovery. *Nature*, 624(7990), pp.80-85.

STRATEGY – BUILDING THE CONTEXT

When it comes to AI, for most countries, the term strategy does not imply a research centered funding push approach. That open-the-bank approach may work for countries that have enough money to throw around for research and wait for something to stick - but this hit and miss strategy may not work for most countries. In fact, I argue that even for developed and wealthy countries, this may not be the best way to approach AI. That approach cannot be the starting point of strategy development.

The United States is facing extremely destabilizing domestic and international problems. The power map of the world is changing where new and emerging powers are now challenging the US led global order. Major wars, and threats of new wars, in Europe and West Asia have already created perilous situations in the world – putting tremendous pressure on the United States. Climate change is taking its toll on helpless humanity. As the world was recovering from the Covid shock, ugly trade wars and decoupling have become a way of life. Uncontrollable inflation is devastating the middle class. Drug cartels have gained tremendous power. Destitute populations of the world are migrating to more developed western countries – creating migrant crises at the borders. Extreme wealth concentration is creating conditions for asset inflation and bubbles. Real wages have stagnated or fallen for most people and social anxiety is increasing. With the political instability experienced between 2015 and 2021, social unrest and instability are high.

Conversely, if we view things from Chinese perspective, China is facing severe problems in its economic and strategic outlook. The real estate crises, decline in foreign direct investment, provinces seeking debt relief, and low consumer spending are eroding investor confidence. Chinese AI and tech firms, like Huawei, are facing sanctions. Anti-China military alliances, such as the Quad, are placing tremendous pressure on China's defense strategy and defense funding. China's expansion plans, especially around the Belt and Road initiative, are now greatly put in check. Tariffs and trade wars along with shifting supply chains and decoupling are forcing China to reevaluate its strategy. All the while Chinese adversaries have increased the soft power onslaught to trigger unrest and encourage protests.

Amid all that chaos comes a technology that can and will affect every one of the above forces. If the global populations are viewed as agents connected by simple interactions of trade and communications, the complexity of this system is already mindboggling. If, however, intelligent entities and decision-makers are introduced in this complex system whose nature of cognition, style, efficiency, and operational functioning are widely different than a system composed of only humans, it forces the system to find a new balance. It can lead to novel emergence. The nature of transactions, the agents, and the speed and magnitude of interactions are all experiencing change. Most importantly, the cognitive makeup of the newly introduced actors is widely different.

From that perspective, the national strategy needs to be about managing complexity that will arrive with this chaos. But that is not the whole story. In this context, strategy is not a tactical plan that has been practiced by a military unit a hundred times in preparation for a specific battle. That type of strategy comes from established military doctrines that call for time tested maneuvers in response to known challenges. The level of challenges in AI is formidable and has introduced never-seen-before variables.

AI strategy of nations is also different from the standard grand strategy approaches. This is because while it may share some aspects of a broader grand strategy frame, the AI strategy frame is dealing with factors such as the greatly altered structure of knowledge, explosive growth in thinking power, and tremendous productivity gains in work output via automation. This introduces elements of change never experienced in any prior strategy development task in human civilization.

It is monumental, to say the least. It needs to not only capture the complexities in social, political, economic, military, and informational domains, it also must deal with the new structures of knowledge production and cognitive frames. Additionally, it must approach strategy from the complexity theory perspective.

Before proceeding with our discussion for the AI strategy, I must point out that at this point in this paper, no one should be unsure that the AI strategy is not only a national level

strategy, but it also encompasses every other strategy that a nation has and that it involves the most important strategic thinking ever undertaken by human civilization. From that perspective, I will apply a broader framework for analyzing strategy, and then expand it to broaden it even further.

Given that the AI strategy has a national role, and its design poses an existential risk to a country, a good starting point will be how the US Department of Defense defines strategy: *A prudent idea or set of ideas for employing the instruments of national power in a synchronized and integrated fashion to achieve theater, national, and/or multinational objectives.*⁵

If we consider these instruments of power as social, political, economic, psychological, and military factors among others – we can recognize that employing them to create a win is necessary to fulfill the intent of the strategy. Here *win* refers to achieving state level objectives – more about it later.

However, the terms *integrated* and *synchronized* do guide us to ensure that the ideas for employing instruments of power are integrated and coordinated. Deployment of strategies to pursue national interests requires awareness about coordinating efforts and impacts of multiple strategic pathways.

⁵ Doctrine for the Armed Forces of the United States, Joint Publication 1, from 2017, Page I-7 JP1

One way to view AI is to consider it as an instrument of national power. This, while helpful, is not the ideal way to approach AI. AI affects all other instruments of power, magnifying and amplifying their impact. This, of course, is only tenable if we consider AI as a force that will essentially be an enormous boost for all other instruments of power that will propel the overall power of a nation to unimaginable levels.

The instruments of power pointed out in the definition of strategy should not be viewed as stationary or fixed. They can all increase individually, and also relative to similar power instruments of other nations.

More importantly, new instruments of power can be added to the set of existing instruments. For example, a nation with a relatively underdeveloped entertainment industry will be unable to deploy that as an instrument of power to acquire greater soft power. But with AI, it can supercharge and amplify the entertainment industry to drive that change. Strategy, therefore, is not limited to deploying or using existing means, but includes both enhancing the known means and discovering new ones.

Despite the simplicity of the above discussion, amplifying the power of the instrument and adding and acquiring new ones is not a trivial undertaking. Add to that the integration and synchronization aspects of instruments of power, and now you are looking at the next level of complexity. Embedding AI to amplify the impact of instruments of power

in a manner where power magnification happens not only individually but also collectively via integration and synchronization is another level of excellence.

Here it is helpful to make a distinction between *adoption* and *embedding*. Embedding AI can be viewed as a researched and structured approach to evaluate and propose how AI will enable amplifying the power of various instruments of national power and to increase their impact via better integration and synchronization. This should include both enhancing existing means and identifying new ones. Adoption refers to the successful implementation and employment of those approaches such that they are accepted and implemented with least resistance.

The above discussion also raises an important question: how exactly can one embed AI to drive changes in instruments of power? This requires reflecting upon the role of AI mentioned in a previous section about enhanced thinking, knowledge production, and work output. Thus, whether the domain of the instrument of power is social or political or economic or military or informational or psychological – AI is adopted to expand thinking, produce new knowledge, and create work output.

The above needs to be done with the awareness that the field of AI is itself rapidly changing. For example, the improvement possibilities with deep learning are greater than with ordinary neural networks which are more than with classical machine learning (for example support vector

machines). Similarly, the advent of transformer architecture and the advances in generative AI change the processes for adoption and embedding. This implies that not only the *what* but the *how* is also constantly evolving.

For my purposes, I define AI strategy as:

A set of prudent ideas for deploying, discovering, embedding, and adopting AI for amplifying and augmenting the overall effect of the instruments of national power in a synchronized and integrated fashion, to achieve theater, national, and/or multinational objectives.

OBJECTIVES AND COMPETITION

The definition of AI strategy that I outlined in the previous section calls for achieving theater, national, and/or multinational objectives. As we consider these objectives, we must return to the real world where national interests clash and compete with and against various forces.

The goal of AI, therefore, is to shape the competitive environment of a country in its favor. AI is embedded and adopted with the recognition that it is being deployed to increase a country's power while simultaneously diminishing the power of the adversaries.

The recognition of the opposing forces, forces that must be contained, exposes the naivety of the standard so-called national AI strategies. It shows that the national AI strategy is

not just about the goals of building your own national power, but also to diminish the power of the adversaries. The instruments of power are deployed not only to enhance your own power but also to reduce the power of the adversaries thereby increasing the power differential.

Thus, the US placing restrictions on China to access Nvidia's advanced AI chips is a clear strategy of diminishing the power of the adversaries. To make further advances in AI, China is dependent upon the processing power provided by the semiconductors designed by the US firm Nvidia. Not getting access to those chips implies China's progress in AI will be contained and slowed.

Similarly, the US is very concerned about TikTok's access to the data on millions of Americans. While that data can be considered as innocuous expressions of joy, songs, dances, recipes, workout and self-help, and similar videos, the US understands that the data can be used by China to shape social, political, economic, psychological, and other instruments of power. This implies that AI provides an avenue for adversaries to intervene, sabotage, subvert, and shape various forces in a nation.

In general, this further validates that the goals and objectives of a country related to AI are competitive in nature and pursuing national interests necessarily involves dealing with adversarial and competitive forces. In my book *At the Speed of Irrelevance*, I argued that the new geopolitical

rivalry and great power competition resulted from the rise of artificial intelligence technology.

Shaping the competitive environment recognizes the presence of competitive forces – but it includes more than just foreign elements. Existing structures of domestic powers, cultural inertia, political frictions, and social attitudes are all such forces that must be countered to create adoption success. Thus, the strategy of embedding AI must contain such factors that can be viewed as constraints or those that damper, restrict or diminish adoption.

In summary, the forces working against the proper adoption of AI could be domestic or foreign. They could be present naturally in cultural crevasses or synthetically architected to destabilize a country. They could be artfully woven into the fabric of political expediency or carefully arrayed as instruments of subversion. But they all point to the same thing: presence of opposing forces that must be included in any strategy development process.

Strategic objectives determined in accordance with the desire to shape the competitive environment of a nation in its favor need to be extended into operational level and tactical level objectives. The operational level objectives are pursued by the “skill, knowledge, experience, creativity, and judgment”⁶ of the staff and hence implies a certain level of necessary training for leaders to pursue and implement AI

⁶ Doctrine for the Armed Forces of the United States, Joint Publication 1, from 2017, Page I-8 JP1

strategic plans. Similarly, tactics, which are viewed as “ordered arrangement”⁷ of activities require developing specific objectives in accordance with the greater strategies. This order of strategic objectives, operational actions, and tactics do not operate in a vacuum. They are made visible, and a performance measurement system is aligned to observe the attainment of objectives and report on new challenges and necessary accommodations and readjustments to the core strategy.

VALUE CHAINS AND MARKETS

The presence of competition naturally draws us into the universe of competing value chains. AI is redefining competitive and comparative advantages of nations. Existing structures of competition in domestic and international markets will give way to new forms of AI centered competition. Social understanding and political acceptance of AI and its possibilities will be instrumental in driving adoption. Understanding the structures of markets and supply chains and how AI will redefine them is critical to develop any AI plan.

Supply chains, like other processes in the AI economy, will undergo tremendous change. That change will impact

⁷ ibid

other variables and those other variables in turn will readjust and then realign the supply chains.

Capital and financial markets will also experience change. This will happen not only from capital flows into the AI economy and a transition from labor to capital as factors of production, but it will also involve the structural dynamics of trading and financial market operations. We can expect the velocity and volume of transactions and trades to rise sharply, and their frequency reshaped due to algorithmic trading routines. Capital will be lost as inefficient business models will be replaced by more efficient ones as companies and countries will operate in the Schumpeter's creative destruction process.

COMPLEXITY AS THE NEW FRONTIER

Complexity arises when we are uncertain about the state of a system. Sometimes, we may have data about a system but even by using that data we will not be able to easily predict its future states. An airplane, complexity experts tell us, is complicated and not complex. The reason is that the cause-and-effect based relationship between millions of parts of an airplane makes the plane complicated but our knowledge about the parts, their interactions, and what leads to what process (cause and effect) is high. This makes the system more predictable and hence less complex.

Complex systems adapt, change, and emerge over time. An open-ended system operates with no defined limits and can achieve novelty such that new and unexpected forms arise in the system.

Flying birds, for example flocks of starlings, make various configurations and form a complex system. Through simple interactions these birds can create complex patterns. Miller and Page describe the essence of complex systems:

At the most basic level, the field of complex systems challenges the notion that by perfectly understanding the behavior of each component part of a system we will then understand the system as a whole.⁸

Carter describes the formation of the complex system by starlings as:

We think we understand why starlings murmur, and there is a beautiful simplicity to it. Each bird is following a set of local rules:

- a. I don't want to be on the outside of the flock because I'm more exposed to predators
- b. I don't want to crash into the 6-7 birds that are closest to me
- c. I don't want to hit the ground.⁹

⁸ Miller, John H.; Page, Scott. *Complex Adaptive Systems: An Introduction to Computational Models of Social Life* (Princeton Studies in Complexity Book 14) (p. 3). Princeton University Press. Kindle Edition.

⁹ Carter, Richard J.. *Cognitive Advantage: How Artificial Intelligence Is Changing The Rules For Winning In Business And Government* (p. 124). Mayhill Publishing. Kindle Edition.

Thus, complexity arises from simple interactions between birds. The interactions are governed by simple rules. Wilensky and Resnick write:

Complex systems theory develops principles and tools for making sense of the world's complexity and defines complex systems as systems that are composed of multiple individual elements that interact with each other yet whose aggregate properties or behavior is not predictable from the elements themselves. Through the interaction of the multiple distributed elements an “emergent phenomenon” arises. The phenomenon of emergence is characteristic of complex systems.¹⁰

Emergence, the key feature of complex systems is the rise of novelty from the simple interactions of multiple actors without a central orchestrator and where order emerges without any preexisting design or designer. These systems are not in stasis or chaos. They are robust and do not dissipate. They persist and exhibit stability without a central controlling mechanism. Unlike the Newtonian mechanistic systems, these systems are nonlinear and do not operate with fixed and explainable causal chains. What makes them unique is that complexity arises out of simple processes. Specifically, we can view them as composed of the two factors:

¹⁰ Wilensky, U. and Rand, W., 2015. *An introduction to agent-based modeling: modeling natural, social, and engineered complex systems with NetLogo*. Mit Press. Page 6

Diverse Set of Actors: Complex systems result when a diverse set of actors are present.

Interactions: The actors dynamically interact with each other based upon some simple rules of interactions.

The interactions of agents form the basic structures of complex systems. Surprisingly, intermediate, and higher order complex patterns emerge from the presence of the above two factors. From cities to biological cells and bodies of organisms, are all complex systems. This ability of complexity to rise from simplicity is a critical design feature of our world and in some ways the preferred and efficient way for organization.

Wilensky and Resnick report that from their experience in interviewing many people they observed that people tend to explain systems in terms of determinism (cause and effect) and feel that some central coordinator or orchestrator is managing these systems.¹¹ People do not attribute such sophisticated patterns to arise from randomness, the authors claim. Calling this the DC mindset (D for determinism and C for Centralized), they also explained that people tend to view the lower-level elements (such as cars, birds, people, ants, bees, traders etc.) and the aggregate patterns (flocks, traffic jams, cities, colonies, swarms, markets, etc.) as somewhat similar and tend to attribute properties of one to the other. They do not view them as separate levels and since the higher

¹¹ Wilensky, U. and Rand, W., 2015. *An introduction to agent-based modeling: modeling natural, social, and engineered complex systems with NetLogo*. Mit Press. Page 10

systems display stability, they mistakenly attribute that stability to lower levels.

The main issue about formulating a national AI strategy is that it must be viewed from the perspective of complexity. We know that the existing complex structures (such as cities, firms, markets, etc.) emerge from interactions between actors and rules of interactions. I will argue that the changes from AI are reorienting and restructuring the established structures and hence the existing institutions will be in great flux. The changes happening are being driven by these two factors:

Agents or Actors: AI has introduced non-human intelligent decision-makers and knowledge seekers. These decision-makers imply that the structures that were formed or resulted from human based decision-making may no longer be robust. A breach has happened. A non-human entity has been introduced in the mix. Whether it is in cybersecurity or recommendation engines, in military planning or automated trading, the presence of non-human actors in the mix is a change that must not be taken lightly. The simple reason for that is that to begin with we are dealing with a complex system – which implies that with the presence of just human actors, the system is complex enough and less predictable. Add to that nonhuman actors and we have now have another set of interactions.

Interactions: The nature of interactions among humans is different. They are driven by the physiological and psychological composition of a human. Evolution has

embedded in humans such constraints and rules that determine the distribution of the character of interactions. The structures that result at an aggregate level emerge from those interactions and rules for interactions. As machines become part of human society, they may or may not exhibit the same emergent structures. The larger patterns of human society might change. Again, they may become more unpredictable or less predictable depending upon the nature of machines, their training routines, their autonomy, and their role in decision-making. Here, I am going to make an unpopular point. As AI training introduces biases in datasets and such biases are removed to make the AI more ethical and less biased, it can also have some undesirable effects. We do not know what type of larger structures will result from their aggregation. In other words, we are changing the behavior of a system at an interaction level without necessarily understanding how it will impact the higher structures as it moves through the layers of complexity. Similarly, the interactions between humans and machines will take place as our existing systems will now include humans to humans, humans to machines, machines to humans, and machines to machines interactions.

The above factors lead us to some uncomfortable positions: the changes taking place are such that they can dramatically alter the larger social and institutional patterns such as democracy, liberty, justice, family, human values, and markets. And despite having good intentions, the uncertainty

embedded in complex systems may give rise to undesirable aggregated patterns. It is not that we are seeking such problematic patterns, the problem is that we just don't know how novelty will emerge. Developing a national strategy is futile without at least attempting to model these forces.

Take the example of traffic. Some experts argue that if all vehicles were autonomous driving vehicles, traffic would flow smoothly. They argue that humans slow down traffic and cause traffic jams as various human emotions lead to traffic jams – for instance curiosity to find out why a car is stopped on the road shoulder. While the prophecy of perfect traffic seems attractive, what is often ignored is that the human processes for traffic are extremely efficient. For example, one can observe cabs stopping to pick up passengers in the middle of the road or trucks unloading and blocking half the street when the parking lane is fully occupied. While such actions may appear annoying, they demonstrate the ability of humans to improvise, to adjust, to be flexible, to reframe the rules without critically breaking them. Humans improvise rules to overcome obstacles, and that type of flexibility is inherent in human systems. Systems designed with no such flexibility may not operate as efficiently as they are being touted for.

Yet, the forces of innovation that arise from within the AI can also alleviate and counter such strategies. They can help us model and create better systems and overcome some of the issues pointed out above. The national strategy development

process should use complexity science to model various strategic actions and study the consequences of those actions.

CULTURE AND COMMUNICATIONS

Cultures of countries affect strategies and their accomplishment. AI programs must take into consideration the respective cultures of countries for which they are being designed for. Technology adoption is as much a cultural phenomenon as it is how strategy is constructed for technology rollout.¹² We know that the Chinese culture will respond to a national program differently than the American culture.¹³ To communicate the rollout of a national program cultural factors should be explored. This means that ideologies, values, and cultures of nations should be integrated into their respective national plans.

Furthermore, communicating the rollout of a program that inspires, motivates, and mobilizes the entire nation is a critical part of the overall national strategy.

¹² Ejiaku, Samuel A.. "Technology Adoption: Issues and Challenges in Information Technology Adoption in Emerging Economies." *Journal of International Technology and Information Management* (2014)

¹³ Pan, Z. *Guanxi, Weiqi* and Chinese Strategic Thinking. *Chin. Polit. Sci. Rev.* **1**, 303–321 (2016). <https://doi.org/10.1007/s41111-016-0015-1>

POLICIES AND STRATEGIES

Being able to tell the difference between strategy and policy is important in AI strategic planning.¹⁴ Great debates have taken place on this issue, and it has also been classified as the chicken and the egg problem – but when it comes to AI, there is no uncertainty that policy must follow strategies.

Policies are tools deployed to achieve strategic objectives and formulation of strategic objectives should not be made a prisoner of policymaking. In the US, both the House and the Senate have been very good with this. They are making policies in response to strategies being given to them by various agencies. While greater transparency and holistic thinking can help all parties, the process is working. In many other countries, there is no link between policymaking and strategy. Establishing that channel needs to be part of the strategy building process.

CONCLUSION

I have defined the national AI strategy as: *A set of prudent ideas for deploying, discovering, embedding, and adopting AI for amplifying and augmenting the overall effect of the instruments of national power in a synchronized and integrated fashion, to achieve theater, national, and/or multinational objectives.*

¹⁴ Kennedy, Robert The Elements of Strategic Thinking: A Practical Guide, Chapter 2 in report Teaching Strategy: Challenges and Response, Editor: Marcella, Gabreil, 2010, report published by Strategic Studies Institute of U.S. Army

The AI strategy of a nation is derived from identifying and discovering the instruments of national power. These instruments of power exist in a competitive environment and are shaped by various domestic and international forces. Since their employment to achieve national objectives requires synchronization and integration, they must be pursued with that mindset. In the end, AI is the ultimate factor that determines the performance potential of all other factors and hence is the largest contributor to national power.

When approaching AI plans, nations should view them as plans for achieving the national objective of maximizing power. Not having the AI strategy or not having a well-developed and robust strategy are existential and sovereignty risks for nations. A plan must approach AI as a force that shapes the competitive environment of a nation in its favor. Opposing forces, both domestic and international, are considered. The plan is modeled using probabilistic graphs and other mathematical processes that can represent complex adaptive systems dynamics.

In addition to formal research and industrial adoption processes, technological change should be taken into consideration as the technology itself is transitioning and evolving at a great pace. Capital markets, supply chains, and financial markets should be considered as part of the strategy. National values, ideologies, and cultures should be part of the framework. Finally, communications and policymaking are critical parts of the plan development.

The above should shed light upon why AI national strategy development is not a trivial undertaking. For all those nations who are currently operating with substandard and dysfunctional strategies, they need to revisit AI strategy development in accordance with this document. For those countries whose AI strategic plans are nothing more than check-the-box flashy documents, they are risking their sovereignty. Not having a robust AI national strategy is an existential risk.