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## Planetary Boundaries and Governance Mechanisms in the transition to the Anthropocene



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# Boundaries, Governance and the International Order\*

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## Abstract

The article examines the distinctive character of the interconnected world of the twenty-first century. The analysis explores the influence of technology on the international system in the modern age, leading up to the unique challenges of the contemporary world. Historically, advances in transportation, scientific breakthroughs, and their military applications have profoundly influenced the ability of states to project power and have had an impact on political structures and configurations. There appears to be little consensus on how these changes influence the debates on power, deterrence, diplomacy, and other instruments of international relations. Traditionally, scholars of the international system have focused on the possession of knowledge and weapons that provided a military advantage in the interpretation of power configurations. Our argument is that the twenty-first century world has a different technological emphasis, that of communications and its supportive satellite and internet infrastructure that forms the basis of the information revolution. The new technologies have succeeded in creating an alternative universe presenting a governance challenge to traditional institutions, laws, and concepts of territoriality.

**Keywords:** Governance, Technology, Information Revolution

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## Introduction

The Anthropocene has been conceived as a period of human dominance of the environment and is credited with fundamentally changing the planet. The term has been popular amongst analysts discussing the irreversible environmental changes that are occurring. It is, however, increasingly being invoked by a wide range of fields such as literature, history, and culture. Humans have undoubtedly been a transformative force for ages through their mastery of the environment by realizing the potential of fire, the wheel, tools, and other technological inventions. This in turn enabled them to participate in group hunting, agriculture, and urbanization among other such developments. The impact of technology and science on human societies and polity has been world-changing throughout time and calls in question the utility of establishing a specific date for the beginnings of the Anthropocene.

The concept of the Anthropocene, of human impact on the environment is an appropriate context against which to evaluate human political and social institutions. It is instructive to consider the influence of some of the principal technological revolutions which are transfiguring the international order. This analysis focuses on the evolution and challenges of an interconnected borderless world that is replacing the great power international system that ensued from the development of technologies that expanded human range across existing boundaries of land and sea.

The contemporary international system is a collection of national societies designated as nation states. It had its modern origins in the Westphalian international order which was perceived to have epitomized the integration of disparate peoples into unified nations that further enabled populations to establish progressive economies and cohesive cultures. The national societies that emerged emphasized a shared political system, culture, and financial system based on a participatory sense. These industrial nations faced challenges in the world that followed as technological innovation steered economies into a post-industrial era of significant social and economic change.

This analysis proposes to examine the impact that the extraordinary developments in science and engineering have had on a renewed interest in the discussion of the influence of technological change on the international system. While structural changes in the international system are influenced by many factors, the role of technology in effecting changes in power configurations among nations has been widely discussed by scholars. Most of the discourse has involved an assessment of the role of industrial progress in shaping the organization of the international order. This is particularly relevant in the context of contemporary breakthroughs in technology that have called into question the ability of the nation-state to continue to function effectively in a changing environment. The international order is faced with the prospect of a borderless world and challenges that transcend traditional physical, cultural, and institutional barriers.

The influence of technology in shaping the international order can be considered in a number of phases including, the scientific developments of the 16<sup>th</sup> and 17<sup>th</sup> centuries that enabled an era of expansion and initiated the great power configuration of the times, the nuclear technology of the twentieth century that led to the balance of power, and the communications



technology of the twenty first century that challenged the existing boundaries in a globalizing world. The first period witnessed the replacement of traditional rulers and monarchies (Wolf, 1962), and the emergence of the nation-state as the primary unit in the international system. Great power status was based on economic power based on industrial strength. The transition from the expanding world to a borderless world was bridged by the introduction of atomic energy and nuclear weapons which, for the first time, brought into play, the concept of deterrence and a heavy reliance on diplomacy. A fragile equilibrium based on a balance of power marked the twentieth century milieu. The unique challenge posed by the information revolution and other communications technologies to the existing international system is explored in the final section of this analysis.

The international system can be assessed in the context of broad changes in structure, as well as in terms of particular interactions between states. Order has characterized international relations when there has been equilibrium in the system based on an acceptance of the *status quo* and the position of the component states within the often-hierarchical arrangement. “An international system is in a state of equilibrium if the more powerful states in the system are satisfied with the existing territorial, political, and economic arrangements” (Gilpin, 1981). Underlying this perspective is the suggestion that equilibrium is sometimes reflective of resignation when the goal of asserting superiority is unattainable and a state will settle for the status quo as the least objectionable choice (Wolfers, 1962).

This would indicate a measure of realism in international relations. Changes brought about, within, and between states, through socio-religious factors or technological developments has led to disequilibrium and concurrent disorder. The assumption that the basic goal of international relations has fundamentally remained the same through the ages is a significant component of the discussion of change in the international system. Many scholars see the international system in terms of an ongoing struggle for wealth and power among its constituents operating in a state of anarchy (Gilpin, 1981. p. 7).

The transformation of the international system has been steered by differing rates of change. Gradual change has characterized some phases of history while other periods have been reflective of dramatic and rapid change. The industrial revolution, the nuclear revolution and the contemporary information revolution can be considered as analytic benchmarks in providing an understanding of the changing nature of power and relations between states. The ongoing discussion on whether technological innovation leads to revolutionary change or evolutionary change (Skolnikoff 1993) suggests that radical change has been induced by conflict in some instances and by technological innovation at other points in time. Scholars are divided on the emphasis that should be placed on technological progress as an independent variable in the study of relations between states and as a factor in analyzing power configurations in the international system. While technology increases the options available to policymakers in their pursuit of the goals of the state, it simultaneously leads to hurdles in the decision making process. Quite clearly, the material environment has a significant influence on transformation although the social conditions and prevalent ideologies cannot be ignored in the analysis of change.

The evolution of social values and political interests can be attributed to gradual change. Unexpected dramatic change, on the other hand, can be found in historical points of reference.



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The dramatic sequences would include technological breakthroughs, political revolutions and other conflict-based scenarios. In such instances, the period of adjustment is compressed, thus resulting in the perception of rapid or dramatic change. Instability also plays a role in such perceptions. Thus, major political changes in the international system can be identified and understood more easily than progressive, gradual change. Both gradual evolutionary change—i.e. process-based change—and dramatic change—i.e. event-based change—have their proponents.

This is reflected in the contrast between a deterministic approach and a predictive interpretation of change. Though it is tempting to explain change in universal terms, it is obvious that the conditions of the historical past are in many ways substantively different from those that prevail in the modern world. The discussion of change as a gradual process or as an event-based phenomenon, obscures the reality that systemic adjustments are often driven by actors responding to the variables driving change.

## The Expanding World and Emergence of the Great Powers

The engineering and scientific breakthroughs of 16<sup>th</sup> and 17<sup>th</sup> centuries advanced the nature of transit and enabled nations to extend their reach across the oceans as well as across the land. A number of scholars have emphasized the significance of navigational advances during the formation of the modern European states system (Mahan, 1897). The advances in transportation profoundly influenced the ability of states to project power by facilitating movement of materials, military forces, and armaments. Maritime technology and naval aviation were seen as a transformative influence on the projection of power in the modern age.

The land routes and highways of earlier periods were no longer seen as the primary conduits of commerce or as instruments for the projection of military power. The development of sea power had introduced a new highway that benefited countries with a shoreline. This perceived disadvantage to hitherto land based communications routes was not universally accepted. Halford Mackinder (1904) (1962) discussed the historical dominance of land routes and their modern transformation. He argued that railroads and improvements in communication had removed any disadvantages of being landlocked. The disagreements on the relative significance between land and sea power did not alter the fundamental agreement that technology and innovation served to stretch the boundaries of human behavior beyond the limitations of the environment.

The development of railroads, chemical industries, telegraph, electricity, and the internal combustion engine served as a transformative influence on the predominantly agrarian economies of the time, ushering the industrial revolution. The great industrial nations were sharply differentiated from states that were lagging in industrial progress by an increase in total productivity that was achieved through the mechanization of agriculture and manufacturing production. Possession and control over raw materials was considered a necessary and important element of national power and contributed to the perception of strength. Power and industrial advantage served to highlight the widening gap between small states and the great powers. These changes impacted the national political process and figured prominently in the discussion of great power status in the international system.



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The strength of industrial nations lay not only in possessing resources and production facilities, but also in the ability to maintain and develop a sustainable knowledge base. Hence, the training of scientists and engineers and the support of research became an important component of political power. Innovation served to broaden the options available to policy makers and, at the same time, inserted greater complexity in the decision making process. This will be more apparent when we examine the changes wrought by the nuclear revolution and the information revolution.

The focus on the interconnections between industrial growth and military strength has prominently featured in interpretations of the foreign policy positions underlying the balance of power in the international system (Taylor, 2004), a historical framework that suggested a close association between “power in production, power in the state, and power in international relations” (Cox, 1981). It was a logical step forward to assert that industrial strength, based on the presence of a highly skilled workforce with a superior ability to process an abundance of raw materials, was a contributor to the projection of military power (Kennan, 1966). Relations between states, alliances, and other interactions were driven by perceptions of relative power and status based on technological superiority (Waltz, 1965).

A related contention suggests that innovation is fundamental to maintaining superiority since it diffuses, enabling nations to challenge the dominance of established powers in the international system (Gilpin, 1994). Gilpin noted, as an example, that while the United States continues to be the dominant and most influential state in the system, its ability to “govern” the system as it did in the past is diminishing. It is increasingly unable to maintain the existing territorial divisions and arrangements and its traditional domains of influence and to enforce the rules that govern the global economy. “The redistribution of economic and military power in the system to the disadvantage of the United States has meant that costs to the United States of governing the system have increased relative to the economic capacity of the United States to support the international status quo” (Gilpin, 1981, p. 232).

The international order was determined by states that had the advantage in materials, facilities, and knowledge for the production of advanced weaponry over those which were lacking. States with advanced technologies dominated the system using their advantage to influence the policies of weaker members and to create dependency relationships.

## The Balance of Power in a Nuclear World

The social and political implications of atomic energy have permeated our understanding of the international order. The nuclear age led to an acknowledgment that it was imperative to envision a new international order centered on the common interest of all states to prevent massive destruction. There was an uneasy sense that in the absence of a common understanding, neither fear nor recognition that the use of modern weapons has the potential to destroy civilization would prove to be an inhibiting factor in modern conflict. The foreboding that peace was increasingly at risk in such an environment fueled the concern that a preemptive strike could be a tempting strategy in the calculus of confrontation. The contention that, historically states have demonstrated a predisposition for conflict (Hamilton, 1941) is often invoked against the hypothesis that scientific progress would lead to fundamental change in the behavior of states.



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The nuclear revolution led to a significant investment in managed conflict and revived the need to examine other instruments of power and diplomacy. A leading outcome of the nuclear era was the evolution of the international system into a bi-polar world composed of two distinct constellations of states (Fox, 1949). This configuration was seen as resulting in a sort of equilibrium that was, nevertheless, subject to periodic crises and proxy conflict. The paradox of nuclear weapons was the conferral of national status and power on states possessing this technology, simultaneous, with a decline in the option of realistic deployment. The value of a nuclear arsenal was essentially as a deterrent that enabled states to continue to maintain their conventional capacities. Prior to the nuclear age, deterrence between nations did not have the conceptual significance that it acquired in relation to the premise of unacceptable retaliation. Based on the recognition that it was unthinkable to envision a nuclear exchange, or a conventional conflict that could escalate into a nuclear exchange, the possession of nuclear weapons was seen as a deterrent to conflict.

This prompted new strategic thinking that emphasized the size and technological superiority of nuclear armaments to assist in signaling the futility of an engagement between potential challengers. Nuclear deterrence and strategy continued to evolve as policy makers attempted to determine vulnerabilities in a nuclear shield which would invite a pre-emptive attack. International relations increasingly came to be defined in terms of a balance of power based on possession of nuclear weapons, and simultaneous efforts to establish global collective security. A realistic assessment of the limits of war entered the calculus of superpower relations (Wolfers, 1962).

The possession of nuclear arms has led to the concept of deterrence as a contributor to the stability of the international system. *Deterrence relies on maintaining the technological advantage and that requires continually keeping up with scientific advances* (Mahan 1897). MAD (Mutually Assured Destruction) is what keeps deterrence relevant as a strategic option. Central to the balance of power that deterrence represents is the awareness that both parties have the same destructive potential. Should technological advancement enable one side to develop faster, more accurately deliverable weapons, the incentive to use the weapons as a 'limited strike' increases. An effective deterrent is only possible when there is transparency through open communication and unrestricted information so that both parties acquire parity. The effectiveness of deterrence presupposes rational actor theory and would have no place in the calculus of leaders who have a messianic and radical world view .

The nuclear age encouraged the consideration of the deployment of a multiplicity of instruments other than atomic weapons to achieve great power status. This was expected to ensure equilibrium in the international order. The traditional propensity to apply force to achieve superiority and military advantage, was substituted by the possession rather than use of such weapons. This led to the initiation of new protocols, the revival of diplomacy, the concept of nonproliferation, and arms control agreements. The post-nuclear environment saw a fundamental alteration of policy imperatives. The realization that the control of nuclear proliferation was beyond the capacity of individual nations led to an increasing reliance on cooperative protocols and policy initiatives that derived from international organizations and institutions.



Mandelbaum (1981) opined that: “technology and politics have combined to create what has been called a nuclear weapons ‘regime’: a system of international obligations (formal accords, tacit commitments, and informal understandings), and doctrines (when, where, why, how, and which nuclear weapons ought to be used) that together govern the role of nuclear weapons in war, peace, and diplomacy.” The nature of the new scientific advances was accompanied by the belief that “advancing technology makes war more horrible and presumably increases the desire for peace” and “each major advance in the technology of war has found its prophet ready to proclaim that war is no longer possible” (Waltz 1965).

As scientific breakthroughs have led to greater sophistication in size, destructive potential, and delivery of nuclear warheads, there has been a greater incentive to maintain an open dialogue between the major nuclear powers. The nuclear revolution thus emphasized the necessity for radical change in political thinking since the new technologies challenged traditional thinking on conflict that balanced political goals with proportionality of destruction.

The expansion of nuclear proliferation introduced a new urgency for diplomatic solutions to conflict resolution, and elevated negotiation to a central role in international relations. An important effect of nuclear weapons on politics was the exploration of disarmament as a solution to the impasse presented by nuclear warfare. Driven by the virtually unusable nature of this technology in war, the pursuit of cooperative disarmament required states to consider removing the sources of insecurity that could lead to conflict. The frameworks representing this approach tended to exclude the non-nuclear powers and often those states that had acquired weaponry outside the accepted protocols. The responsibility to formulate conditions for this objective was given to the UN disarmament commission, a body composed of all UN members.

The commission met infrequently but it did serve to articulate world opinion on the issue. As an international instrument, its function was limited since the most significant initiatives at disarmament would have to come from the two main powers that possessed large stockpiles of weapons--the Soviet Union and the United States. The idea of unilateral disarmament was urged on by peace movements and extensively discussed in various forums. The proponents of nuclear disarmament had no investment in deterrence as a strategic policy.

Tension-reducing and confidence-building agreements, such as ‘non-aggression’ pacts, ‘no first use’ pledges and other measures, have been proposed and honored up to this point. A number of arms control measures accompanied the attempt to reduce, to control, and hopefully to eliminate nuclear weapons. The effort to reach agreement on the quantity and quality of weapons stockpiles were reflected in the SALT (Strategic Arms Limitation Talks), SALT I (1969-72) and SALT II (1979). While they remained unratified, they provided useful precedents for controlling and limiting major weapons systems. A related treaty involving efforts to limit the use of nuclear weapons from the sea bed was the Seabed Treaty (1971). The conduct of international relations in the nuclear age has been marked by dialogue involving meetings, conferences, and draft treaties.

The drive toward nuclear non-proliferation has not been effective in discouraging the spread of nuclear technology and has been thwarted by the existence of an underground network involving technical assistance and political encouragement. The principal signatories to



the NPT (Non-proliferation Treaty) have predictably been most of the major nuclear powers, with a few notable exceptions primarily among the emergent nuclear states. The major powers do not possess the ability to convince states to desist from acquiring the nuclear weapons. It is doubtful whether they will be able to prevent non-state actors from acquiring and using these weapons. The underlying problem is the calculus involved in using atomic weapons. Many non-state actors are not invested in survival as the ultimate goal of conflict. They are more likely to subscribe to the vision of mutual destruction in the pursuit of a higher, other-worldly reward.

The development of nuclear technologies provided an opportunity for states to engage in a measure of cooperation on the peaceful use of atomic energy. Knowledge based dominance characterized the inherently unequal relationship between the donor nations and the recipient states and established yet another measure for differentiating superpower status in the international system.

The emergent nuclear powers, unconstrained by the concept of non-proliferation, have added an element of uncertainty to the existing balance that has characterized the relations between the two major nuclear powers. It is unclear whether the new entrants to the nuclear circle are inclined to subscribe to the code of conduct that has defined the behavior of the super powers, or whether their political goals allow for large scale devastation. The acquisition and use of nuclear arsenals by non-state actors and groups represents the uncontrollable and unknown danger posed by nuclear proliferation (Mandelbaum, 1983). The fundamental concern is fear that the newcomers do not subscribe to the accepted rules by which the traditional actors of the international system operate (Van Creveld, 1989).

## The Borderless World and the Networking Revolution

Advances in the areas of chemical, biological, nuclear, and communications during the twentieth and twenty first centuries have transformed the traditional dynamic of the international order. These scientific developments have led to the emergence of a globalized, interconnected world, that is at once complex, interdependent, and often borderless.

The twenty-first century is increasingly being defined by communications technology and its satellite and network infrastructure. The evolving role of communications technology characterized by speed, wide availability and distribution has long been seen as transformative of societies and statecraft by analysts of the international system. Some scholars have suggested that transnational challenges would lead to a revolution in statecraft distinguished by the evolution of nonmilitary instruments and processes (Sprout, 1962). The central role played by global information networks in conduct of international relations has been extensively examined in Howard H. Frederick's (1993) *Global Communications and International Relations*.

The progress in communications technology has led to a fundamental reassessment of many of the assumptions underlying the structure of the international system. Contemporary scientific development has altered the accepted ways of thinking about the nature of war, national boundaries, and the principal actors in the international system. The effect of communications technology and the information revolution is global in scope and significance, and has extensively transformed the economic, social, and political landscape. The dynamics of



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the information revolution have inserted a new motive force in international relations, the economy, trade, and in aspects of personal life. Governments are faced with unprecedented challenges emanating from emerging technologies that represent a large measure of uncertainty and risk.

The technologies that are expected to have the most significant impact on the nature of governance and decision making are computers and electronic communications, as well as chemical and biotechnological developments that enable individual non-state actors to brandish a level of power that was hitherto confined to the collective control of the state. Technological progress underlies both cooperation and conflict between states--a reality that is particularly relevant to understanding the interdependent world shaped by information technology.

The political implications of communications technology are manifest in the shifting scenarios of power in a transnational environment today, as a result of the information revolution, power has shifted in the direction of information possession and information control. Individuals have been empowered by access to information, while states and institutions exert power by controlling and blocking access to the networks. Exerting control over information is complicated by the structure of networks which constitute an essentially decentralized system of interconnected nodes that operate independently.

The internet's underlying technologies have been widely dispersed through its large-scale diffusion and its worldwide networks have resulted in the creation of a global community. As the conduit for rapid information flows, the global networks have no precedent in the history of technology. Information technology is being increasingly viewed as a basic resource of mankind, along with energy and wealth.

Large databases containing immeasurable details of interest for potential disruption are globally available. Groups and individuals have undetected and anonymous access to open public sources of information. It is easy to access detailed knowledge about nuclear power plants, public buildings, airports, and ports, transportation networks and even about measures to counter-threats. The world wide web offers intelligence on critical economic nodes, providing the opportunity to probe for structural weaknesses in systems and to predict cascading failures throughout related networks. Weapons, such as bombs, can be assembled with information available openly and the internet is used as a communications channel for coordination and planning.

Networking that enables subversive groups to operate as decentralized units independent of a central command and control configuration provides the additional advantage of reducing transmission time, concealing identity, and being relatively difficult to pinpoint. The internet has led to the erosion of hierarchical structures in many organizations, but especially among transnational groups whose activities have a global reach. The information revolution has created digital capital that is empowering groups and individuals in ways that often challenge the dominant power of the nation-state. Those nation-states with the greatest freedom of information and the technology for its transmission have political and economic influence.



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The new technologies are seen as fundamentally altering the accepted boundaries of time, and space representing a challenge for political theorists accustomed to physicality (Wolin, 1960). Many analysts observe that the new technology is enabling people to conquer time. Real time transmissions of events require instant responses which are not structured into the decision-making process that has traditionally characterized the international system. Financial transactions, for example, can occur almost instantaneously. The global economy is based on financial data transmissions that discount national borders and facilitate the empowerment of remote markets by placing them in the same playing field as the economic powerhouses. Networks facilitate information and disinformation flows at an accelerated rate that makes it difficult to absorb, organize, and react in a measured manner. Responses are required to emerge at a speed that is not structured into the existing decision-making process.

Communications networks are also responsible for shifting people's spatial orientations based on traditional economic, social, and political boundaries. This has resulted in a dual trend of the reconfiguration of accepted identities and of the simultaneous reinforcement of traditional identities. The representation of the new environment as one of distant proximities, in which demographic and social distances have been compressed by the dynamics of technology, is central to Rosenau's insightful analysis of the fundamental changes that differentiate the information age from previous periods. It goes a long way toward making the case for a new conceptual and terminological framework for the study of international relations in the information age (Rosenau, 2003).

There is a broad consensus that contemporary technologies have resulted in constructing an alternative universe whose governance presents a challenge for conventional institutions and laws that rely on traditional concepts of territoriality. The need for a new conceptual vocabulary to describe the environment in which innovative integrated technologies, communications networks, and information utilities operate, has been both recognized and addressed, to some extent. The most commonly used term for describing the new realm or organization whose functioning poses a significant challenge for the conventional economic and political system is Cyberspace.

The term enables the visualization of the electronic databases and flows of information, the source and consumers of that information in a virtual world that crosses and blurs the boundaries of the world that is familiar. Geographically, it crosses and blurs physical boundaries, while sociologically, the communities of cyberspace cross societal and cultural boundaries. Politically, the governance of the virtual world results in a unique challenge for national and international institutions. The power of networks is diffused beyond the sovereign states' capacity to exert control. The result has been that policing the internet has varied and included self-regulation as well as government censorship.

Cyberspace can be conceived of as a new (virtual) planet separated from and simultaneously existing within the known geographical world. It is defined by its lack of an identifiable spatial presence, as well as its seemingly borderless nature and its fluid and constantly changing (virtual) communities. The mapping of cyberspace, identifying its



communities, and comprehending its vulnerabilities, is a step towards determining the level of governance that is needed. Complementing the evolution of the internet itself and the private and public regulatory initiatives that have characterized its life span is the evolution of the debate on governance that has oscillated between the advocates of an open network that is largely self-regulated and those that cite security concerns in support of state intervention.

The global diffusion of technology and industrial production is propelling the forces for internationalizing the state in the sense that it is internationalizing the policy process in areas such as arms control, internet governance, and global environmental policy. Skolnikoff (1993) suggests that technological change underlies decentralization of power and suggests that it would be difficult for absolute power to continue to be exercised in the new technology-driven political environment. He notes that “there is today a large and expanding sector of national and international activities not under the direct control of governments, nor accountable to them, that impinges on the authority of governments and constrains to varying degrees their freedom of action or ability to order events. This is arguably the most significant aspect of evolution in international affairs that has accompanied technological change.” He is convinced that the new technological environment will place limits on national action.

In *The International Imperatives of Technology* (1972), he articulates his position definitively, suggesting that the degree of international regulation and control over the internal affairs of nation-states would be in excess of anything that has ever existed. Interdependence impels cooperation in a global economy. Such analysis highlights the increasing realization that states no longer possess exclusive access to destructive technologies. With the proliferation of knowledge through the Internet and the growing presence of non-state actors, biological, chemical, and nuclear technology is within the reach of a larger constituency in a global world. Technology has given an advantage of sorts to the forces of asymmetric warfare and provided them with the means for communication and the knowledge for manufacturing weapons. In the contemporary world, the possibility of NBC (nuclear, biological, and chemical) being first used by non-state actors is particularly alarming.

We have been conditioned to believe that financial capital contained in physical assets with monetary value is a most valuable resource. In the twenty-first century, the most valuable capital is progressively non-physical and weightless. Much of traditional finance and money is now manifest as digital capital. Financial transactions, bank accounts, shares, bonds, and similar financial instruments have been transformed into data exchanges independent of physical documents and ledgers. The gravity-bound capital of previous centuries--land and physical wealth-- has acquired a virtual character. Digital capital is increasingly a major new domain of power and property based on new paradigms and scope.

Cyber technologies have succeeded in altering the scope and meaning of invasion through cyber threats, which are a blend of cybercrime and cyber war and which are often undifferentiated in terms of the kind of destruction caused, as well as the required level of defense. The cyber threat is the idea that organizations or individuals may be spying on, tampering with, or preparing to inflict damage on electronic networks. These intrusions have several goals, some are classified as simple cybercrimes involving identity theft and essentially representing a modern form of burglary and highway robbery. Cyber warfare is an attempt to



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infiltrate secure economic systems and infrastructure grids to paralyze the economy and effectively neutralize societies.

These assaults are designed to destroy the electronic systems underlying financial transactions including banking; disrupting transportation networks such as air traffic, inducing massive power failures such as blackouts and definitely aiming to disable defense and national security infrastructures. Defending against such threats challenging since this is a realm where the attacks are continually evolving, requiring a constant response. Virtual invasions are a cost-effective strategy to project power and dominance and can dispense with the need to invest in military organization, hardware and personnel. Cyber-attacks may emanate from states, non-state actors, or a combination of forces.

Cyber-attacks originating from a suspected nation-state present a real threat. The sophistication is reflected in extremely focused targeting of defense engineering data. The security of electronic information systems continues to be viewed with complacency in the absence of dramatic and attributable cyber invasion. Electronic-commerce systems are already in a constant war against online fraud, requiring high investment in risk management. The most desirable solution would be international efforts to secure data networks, under the assumption that as states become more integrated into the global structure of interrelationships, financial and otherwise, it will be essential to develop cooperative international protocols to secure the networks.

### Conclusion

In conclusion, advances in technology, and, the information revolution, have demonstrated the limitations of borders in a globalizing world. Additionally, the interpretation of power configurations in the international system that had traditionally relied on measurements of military superiority was now challenged by a new perspective. An important and widely held view was that scientific breakthroughs in themselves were not as significant as their military applications in determining the impact on political structure. The military superiority, that was achieved through technological progress and contributed to political prestige and economic power was now up for review.

Scientific advances and industrial progress continue to be integral to the discourse on power and status in international relations. It is equally evident that advanced military technology with its enormous potential for destruction creates an environment for exploring diplomatic and other alternatives to war and contributes to the evolution of strategic alternatives, such as deterrence. In a world that finds itself technologically limited to conventional conflict, peace becomes a critical objective. Finally, a remarkable development of the advance of nuclear, biological, and chemical weapons is the prospect that the principal players in international affairs may include a new set of systemic actors such as the individual and small group and may no longer be confined exclusively to nation-states.

The proponents of a transformed world order draw our attention to the concern that the presence of these actors---the individual, the NGO and the terrorist group---demonstrates that there is no effective state control on their access to technology and their unchecked ability to



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communicate across borders can have far-reaching consequences. It is the role of these elements that is central to much of the discussion surrounding the establishment of a global order reflecting multiple influences.

The diffusive potential of technology has demonstrated the ease with which individuals and non-state actors can have access to sophisticated weapons and introduces an element of uncertainty into the strategic calculus. Retaliation degrades as an option in an environment where the adversary cannot be identified and actors may have no determinate and recognizable location.

Many analysts see conflict and competition rendered obsolete by integrative economic forces (Krugman). In the past, economists thought that only goods could be traded across borders, while most services could not be imported and therefore were not subject to the same pressures from international competition. Technology has undermined this assumption and the movement of services from the West to the developing world has shifted the power equation. The transformation of the geo-political environment is driven by change that operates in a virtual world that poses tremendous challenges for governance.

These challenges exceed the capacity of any one state or group of states and require cooperative institutions, policies, and enforcement mechanisms. This has led some analysts, such as Peter Drucker, Alvin Toffler and Esther Dyson to envisage a multi-governance structure based on multiple identities and loyalties held by the population. The debate on the new world order has coalesced primarily around two perspectives-- one proclaiming the continued relevance of the nation state and its institutions, and the other anticipating the eventual development of and strengthening of supra and transnational bodies which would supersede, in some instances, at least the authority of the individual state.

The argument for the continued relevance of the nation state in setting policy rests on the observation that if technologies are the driving force behind the development of the supra-national institutions of the modern age, then the lack of access to these technologies by a large proportion of the global population continues to give the upper hand to national elites that control access to technology. This argument reinforces the justification for the continuing supremacy of the state in the international order.

The issue is whether the new technologies are leading to fundamental alterations in the structure and functions of the international, or more aptly, the global system. Of particular interest is the challenge posed to traditional power structures by the asymmetric threats and the newly emergent actors empowered by the new technologies. The analysis is placed within the context of the early discussion surrounding the factors responsible for the rise of the West, including the technologies contributing to the industrial revolution, as well as the differing emphasis placed on the importance of technological innovation as a determinant of change in the international system. The traditional views of territorial possessions as indices of power, and of territorial expansion as the principal course through which states acquired prosperity and security is re-examined in light of the contemporary technologies. The current focus has shifted to an assessment of information possession and control of communication as indices of global power.



As the dynamics of globalization overtake territorial borders creating a greater interdependency and communications technology outstrips traditional social collectivities the nation state itself becomes somewhat diminished in its ability to manage the transcendent forces in play. Globalization has increased the interconnectivity in hitherto unimaginable ways. Interdependency has greatly increased and migration has blurred the boundaries of nationality and political loyalty. Much of this is attributable to technological advances that have enabled international mobility amongst peoples through travel and connectivity via the world wide web.

The wave of new technologies that have emerged over the centuries have created new economic opportunities and power constellations that have determined the shape of the international system. It is possible to envision a world in which the smart power represented by information technology is surpassing armed force and military superiority. Contemporary technologies, with their potential for transnational outcomes, appear to be leading us into an ever more cooperative world.

An alternative viewpoint presented by Lewis Mumford is critical of the utilitarian perspective underlying the analysis of technology in society. This perspective attributes the emphasis on technology to the utilitarian bias that dominated the scientific community in the nineteenth century and seeks to place technological development within the framework of other cultural and social influences. Discussing Leonardo da Vinci and his forays into the scientific future, Mumford observed that Leonardo himself committed to paper even more remarkable forebodings of the world than science and mechanization would eventually bring into existence (Mumford, 1967). As we consider the impact of information technology on the study and conduct of international relations in the contemporary world, it is interesting to note Mumford's prescient thoughts.

The erosion of national political power as a consequence of transnational forces impels a reassessment and reorganization of the contemporary global order. It is increasingly obvious that the system, as it is presently configured is inadequate to confront the ongoing challenges. Conventional solutions are not designed for the unconventional transnational environment. Governance mechanisms of the new era need to address financial regulation, construct adaptable democracies, and envision cooperative solutions for conflict resolution. The architecture of current technological systems offers an opportunity for reconsidering the concept of citizenship so it can reflect more accurately the reality of migrant movement that supersedes boundaries and territorial identity.



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