The Political History of the Internet:

A Theoretical Approach to the Implications for US Power

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Introduction

During the 1970s, global financial challenges including the failure of the Bretton-Woods system and the world oil crisis brought into sharp focus the complex interplay of politics and economics. Attempts to better understand the intricacies of this relationship led to the emergence of the sub-field of international political economy (IPE). In a similar manner, the disruptive effect of information and communications technology (ICT) on international affairs has provided impetus for a more integrated inquiry into the connections between the fields of technology and politics. Working to better comprehend this complex relationship has highlighted the fact that some questions are not easily addressed by existing international relations theories and concepts.

In seeking to better understand the relationship between state power and new technology, this paper focuses on the political history of the internet in America. Despite states' increasing dependence and interdependence upon the global network, the political history of how this technology was initially conceived, developed, governed and managed over time is not adequately understood. Although "histories of the internet" abound, they are almost exclusively concerned with documenting key technicians and developers and attributing their achievements and contributions to the code and architecture now in use. However, the political forces surrounding those developments are rarely referenced in these accounts and given no substantive place in understanding the progression of the internet from a military

project to an open global network. Key enabling legislature, policy mandates, the role of the state in enabling or dissuading internet governance and the influence of governmental perceptions and intentions in shaping the technology are largely absent this work leaving an important aspect of the development and ongoing management of the internet unexamined.

In designing this research project, it became apparent that existing international relations theories cannot provide an adequate framework for comprehending this multi-faceted and important issue. Although international relations has a range of theories about power, it has not yet developed a corresponding research project to explain approaches to technology. Just as a lack of economic literacy restricted the discipline prior to the emergence of IPE, the lack of technological literacy is having a similar effect by hampering efforts to move beyond existing paradigms which largely address industrial rather than information technology. Understanding how to incorporate new technologies like the internet into international relations theory is increasingly being recognised as an important research project (Mayer-Schöenberger and Brodnig 2001, Rosenau and Singh 2002, Weiss 2005, Eriksson and Giacomello 2006).

One solution to this theoretical impediment can be found within the discipline of the philosophy of technology. Primarily concerned with the interaction of technology with every aspect of the human experience, the philosophy of technology articulates a range of "approaches" which frame our understanding of and response to technology. Each of these approaches leads to a methodological framework. This study finds that two of these approaches dominate current international relations literature but it is in fact the third approach which can help to expand the breadth and depth of studies dealing with power and new technology.

The following brief introduction to the philosophy of technology will lay a foundation for the application of central concepts and approaches which can be observed and integrated into international relations literature. The second section of this chapter identifies two dominant paradigms within international relations for understanding the relationship between technology and power. These paradigms are comprised of self consciously articulated theories of power coupled with (generally) unself-conscious but clearly evident approaches to technology. Neither of these two paradigms is proving consistently effective for understanding the relationship between power and technology in the information age as they either remain embedded in industrial age concepts and theories or they fail to effectively engage with complex technical issues. Finally, this chapter will explain how the application of the third approach – the social construction of technology – can be applied to the study of the political history of the internet in the United States to better understand the complex relationship between power and new technology.

Philosophy of Technology

The emergence of the philosophy of technology as a discipline was a response to rapid changes in technology and science. Prior to the industrial revolution, the pace of change was not generally sufficient to radically affect the wider social fabric during the course of an individual's lifetime. However, the past two centuries have been a time of fairly constant, rapid and profound technological development. This has lead to what Norman Vig calls "a dominant paradigm of adaptation to changing technology" (Vig 1988). Attempts to better comprehend the impact of technology on the human condition have emerged as a coherent study now referred to as the philosophy of technology.

The philosophy of technology asks questions like "how does technology impact upon social structures?", "how and why do social groups seek to shape technology?", "does technology follow a pre-ordained developmental path?", and "if so, are we powerless to stop it?". These questions have as much relevance in the context of information technology as they did to industrial technology. Indeed, it is these questions and others like them which need to be applied to international relations literature attempting to understand issues of the complex relationship between power and technology. Instead, much of the literature addressing these issues remains tied to paradigms developed within the context of industrial technology and specially suited to those issues which arise from it. The philosophy of technology can provide a conceptual bridge for moving beyond those paradigms.

Within the philosophy of technology, there are a range of approaches which have been articulated by a number of scholars. Although the nomenclature may differ, the concepts are relatively stable across the discipline. This paper adopts the definitions offered by Norman Vig of *instrumentalism*, *technological determinism* and *social construction* (Vig 1988). These three "approaches" to technology will later be linked to existing international relations literature demonstrating the prevalence of instrumentalism and technological determinism and explaining why the social construction of technology provides a means of arriving at new questions and answers to the problem of power and technology.

Approaches to Studying Technology

The approach referred to as **instrumentalism** regards technology is a means to address a human-defined problem or need. In this approach, technology is morally neutral and disconnected from its social consequences. Dominant in the commercial sector,

instrumentalism justifies continuous innovation while also implying that if there were to arise any negative social outcomes, the answer to them probably lies in a technologically based solution.

In studying two concepts of a fundamentally social nature like power and the internet, an approach which disengages from the social is not appropriate. In this study, an instrumental approach would lead to questions about whether the design is "good" – that is, does it address the problem or purpose it was intended for? Is it being used for its intended purpose and is that *purpose* socially acceptable? Interesting though they are, these questions fail to engage with the profound impact of the internet which goes far beyond its originally intended purpose and it also makes it difficult or impossible to engage with changing perceptions of American power.

Technological determinism (or autonomous technology, as it is sometimes referred to) *is* a social view of technology, however it is based on a mono-directional relationship. That is, technology has an impact on society – in many cases, a profound impact – but it is an external force over which society has minimal control or influence. It is the story of Frankenstein, of technology running along a predetermined evolutionary path which may or may not be beneficial for society but which is largely unstoppable. A determinist approach certainly does not see technology as "value neutral". Rather, it is regarded as imbued with values like a desire for power, the quest for efficiency, and the profit motive – "over other human needs (including those of future generations) and against the integrity of nature" (Vig 1988: 17). The fear of technological determinists is that once large systems are in place, it becomes very difficult to alter or reverse them – they become so embedded in society that they are not necessarily respondent to changed human perceptions about their value or use. In this context, an elite group of "technocrats" control what Lewis Mumford called the

"megamachine" leaving the rest of society vulnerable to its effects (Mumford 1967). This view negates social choice – it does not take into account the many decisions which societies do make about how they will develop and use technology. Technological determinism could provide a methodological framework for one half of this study. If the research aim were simply to examine the impact of internet technology on political ideas of US power, this approach may have been adequate. However, it is irreconcilable with an epistemological position of constructivism which underpins the other half of the research aims – how ideas of US power have shaped and influenced the development of the internet. An essential starting point for this study is that states do make decisions about how they believe the internet should best promote their national interest and enhance state power but technological determinism would refute that claim.

Problems of the previous views led some scholars, particularly historians and sociologists, to adopt a new approach – the **social construction of technology** (SCOT)[1]. For these scholars, technology is not a neutral instrument for problem solving nor a value laden force which threatens human autonomy. Rather, it is an *expression* of social, political, and cultural values. Vig writes that "decisions about which technologies are developed and who benefits from them are shaped more by cultural preferences and the distribution of financial and political power than by specific problems or technical opportunities" (Vig 1988: 15). The social construction of technology rejects the premise that a particular technology succeeds simply because it was "superior" to other competing options. Trevor Pinch and Wiebe Bijker

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[1] As this chapter is adopting the nomenclature of Norman Vig, this approach should perhaps be referred to as "Contextualism" which is his term. However, for consistency with the rest of the paper, it will be referred to here as the social construction of technology. The two terms are interchangeable.

illustrate this theme through a sociological history of the development of the bicycle, citing a range of social, judicial and moral influences which combined with the application of science to favour certain bicycle models over others (Pinch and Bijker 1989: 17–50). Superiority, of course, is a subjective term and dependent upon the articulation of stated priorities. In addition – and particularly relevant for the internet – adoption changes technology. Those who use it, improve, exploit, adapt and shape technology. In this process, priorities and the means by which success is measured may change. Therefore, SCOT argues that the emergence of any new technology needs to be understood in the context of social and political forces at work which influence choices and preferences.

A SCOT approach to technology leads to questions such as, how are technological priorities ordered and by whom? What happens to technology when those priorities are altered? And, fundamentally for this project, what role do ideas play in this process of shaping technology?

In the next part of this chapter, these approaches will be contextualised within the frameworks for understanding power and technology which currently exist in international relations. By merging these two conceptual fields, it becomes apparent that international relations literature is dominated by paradigms which adhere most closely to either instrumentalism or technological determinism and that the introduction of SCOT may provide a theoretical bridge for moving beyond the existing stalemate in the literature.

Existing Frameworks in International Relations

Understanding power in international relations is an ongoing and unresolved academic project. A key shift in recent years has seen scholars more comprehensively explore the social

aspects of power as opposed to the previously dominant theoretical view which regarded power more narrowly defined as material. In part, this shift has been necessitated by key systemic changes within the international system as a consequence of globalisation and the conclusion of the Cold War. Recent developments in information and communications technology have played an important role, however the relationship between power and new technologies remains under-theorised.

The following section of this chapter will demonstrate how ideas about power have changed over time but that understandings of its relationship with technology have remained remarkably stable despite the recent introduction of very different technology. This would pose no problem if the theory retained its explanatory capability, however there are compelling reasons to argue that it does not. The first section, entitled "The Industrial Age: Technology and National Power" brings together realist notions of power and an instrumental approach to technology which (largely) dominated international relations literature from the second world war to the late 1980s and (for some) the early 1990s. As noted earlier, a key characteristic of instrumentalism is a view of technology as a morally neutral means to an end. This approach dovetails with political ideas of the state as morally neutral, compelled to survive in a self-help system by any means necessary. The second section entitled "The Information Age: Technology and Social Power" brings together the changes in approaches to power which have emerged largely since the conclusion of the Cold War, with the information revolution. Much of the literature in this section is characterised by a technologically determinist view which (often due to insufficient technical knowledge) tends to regard new technologies as value laden and autonomous. This view aligns more comfortably with ideas about American

power which emphasise moral responsibility not only to its constituents, but to a broader global community as well.

Through a discussion of the dominant frameworks extant within international relations literature, this section will elucidate the problems with each view thereby justifying the adoption of a new framework for examining these issues. Essentially, these two competing frameworks arrive at a stalemate based on an unquantifiable question. Does new technology enhance state power more than it undermines it? This project argues that it does both and therefore, it would be more useful to ask some different and more enlightening questions. Those questions include *how do states influence the emergence and management of new technologies to address their national interest? How does technology itself, influence perceptions about state power? And what role do ideas play in the political shaping of social technology?* These questions cannot be asked or answered within the two paradigms which currently dominate international relations theory. The first does not engage with technology as a social construct and the second does not fully account for the political influence and shaping of technology. A social construction of technology methodology which focuses on these very issues, will consequently prove more useful.

The Industrial Age: Technology and National Power

> *The healthy functioning of cyberspace is essential to our economy and our national security. (Bush 2003: 1)*

For much of the twentieth century, scholars of international relations have approached the relationship between power and technology in a relatively stable and consistent manner.[2]

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[2] Within realist thought, there are a range of views on how power should be defined, ie. whether as a means to an end or an end in itself. This paper will not provide a comprehensive catalogue of variations in realist approaches to power. It is

Through the dominant lens of realist theory which views the state as a self-interested, power-maximising unit in an anarchical system, technology has been regarded as a constitutive element of state power. Its military and economic relevance has made technology a mechanism through which power (or security) seeking states pursue relative advantage by the development of more efficient production methods (economic power) as well as advanced weaponry (military power) (Morgenthau 1978: 322). Having explained something of the philosophy of technology and instrumentalism, it is possible now to explain how that scholarship intersects with realist power theory to produce what is referred to here as the "nation-state" approach to the relationship between power and technology in international relations.

Realist power theory argues that power must be narrowly perceived as material capabilities due to their relative importance in determining the outcome of conflict and also their quantifiable nature. The realist adherence to this view of power coupled with neo-realism's emphasis on system structure underpinned the importance of technology as (despite the acknowledgement of other factors), material capabilities continued to be viewed as the most important and decisive element in ordering the system structure. Indeed, the 20th century witnessed a growing emphasis on technology as material capability while other more conventional resources such as population and territory came to be regarded by some as diminishing in relevance. Employing a Fordist approach, Alastair Buchan wrote of the decline of territory and population as a form of power with emphasis instead placed on states' technical and scientific base. In his view, "power, influence, or prestige can now be increased

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concerned here only with understandings of the relationship between technology and power in international relations and as such is proposing two broad conceptual approaches – the first of which – the nation-state power view, is most closely associated with a broadly realist approach.

by the better organization of existing domestic resources and the application of science and technology to them" (Buchan 1972: 177).

A material view of power sits comfortably with an instrumental view of technology – indeed, they complement one another. The combination of an instrumental view of technology as a value-free tool employed to achieve the ends of a state with only one moral objective – survival – results in the "nation-state" approach to the relationship between power and technology. In this framework, technology is a mechanism to enhance state power and thereby has implications for world order.

Despite more recent theoretical and empirical challenges, the nation state view continues to resonate in contemporary international affairs as states persistently attach a high value to advanced technology as it relates to state power. By continuing to regard ICT as an artefact like other forms of industrial technology, the vulnerabilities which come hand in hand with the rapid integration of ICT into contemporary state affairs are surmountable. States simply need more – more ICT capabilities, more rapid advances in the development of these technologies and more doctrine for their application. This perspective resonates with the instrumental approach which regards technology as morally neutral and able to address negative social consequences of technology with a "techfix". In this context, militaries the world over are rapidly developing "information warfare" or "cyberwar" capabilities. The US Department of Defense now views information as a "realm, a weapon, and a target of warfare" (Wilson 2006: 1). Information and communication in the nation-state view becomes a commodity to be weaponized in the same way that previous industrial-age technologies were. There is a general sense that ICT is becoming a significant factor in conflicts and that militaries need to adapt and be prepared to project state power throughout this new sphere. Thus

dominance in "cyberspace" is equated with dominance in other international commons such as space or sea lanes (Tanji 2007).

However, operationalizing these capabilities in a conventional conflict situation remains difficult. Under both domestic and international law, responding to aggression with reciprocal force over the internet is highly problematic. The determination of what constitutes the use of force in the context of a cyber-attack remains unclear – one of the key problems highlighted in 2007 when Estonia turned unsuccessfully to NATO for help while undergoing a massive cyber attack (Grove, Goodman and Lukasik 2000). Although ICT has certainly been applied to enhance existing warfare technologies, regarding information and communication technology simply as another commodity fails to acknowledge its distinct nature and the complexities of operationalizing it in the context of state to state conflict.

While a material view of power and technology may have been useful in understanding the dynamics at work in conventional conflicts, ICT lends itself to unconventional conflict characterised by anonymity, geographical dislocation, low ranking actors on par with states and the interdependence of industrialised states on a vulnerable global network. Just as nuclear technology prompted a shift from wars of destruction to a strategy of deterrence, ICT is being understood more clearly as a technology of "disruption" (Demchak 2003, Shimeall, Williams and Dunlevy 2001). The impact of disruption is at the heart of a key paradox of ICT – states which have been most successful in adopting new information age technologies are also most vulnerable to disruption (Christensen 1999, Markoff 1991). This is the central power/technology paradox which the nation-state approach is unable to address.

While new technologies have certainly had a positive impact on existing industries and security, the theoretical challenge to international relations has been the emergence of

fundamentally social rather than industrial technologies. Unlike the early part of the twentieth century which was characterised by a strong realist practice and fundamentally industrial technology, the latter decades saw a growth in a theoretical reassessment of power coupled with the emergence of revolutionary social technology. The relationship between social technology and concepts of political institutions like power and sovereignty appear to be distinct from those of industrial technology. Not surprisingly, theories predominantly concerned with material power have not easily synthesized emerging social technology. To date, more ideationally inclined theoretical frameworks have generally been used to examine the relationship between new technology and power and it is to these that this paper turns next.

The Information Age: Technology and Social Power

> *The realpolitik of the new era is cyberpolitik, in which the actors are no longer just states, and raw power can be countered or fortified by information power (Rothkopf 1998: 326).*

From the beginning of the 90s, applications for ICT expanded exponentially. Simon Rogerson and Terrell Ward Bynum (1995) describe computer technology as "the most powerful and most flexible technology ever devised". Access to the internet rapidly moved from a small band of academic and military clients in the mid 1980s into the public domain. In a very short space of time, ICT has become ubiquitous in advanced industrial states and integral to the delivery of essential public services including national security. Newly industrialised and industrialising states regard ICT as a mechanism to "leapfrog" generations of technological development and move more quickly towards modernisation and competitiveness in the international system. In addition to the innumerable applications of ICT to enhance essentially industrial technology, the social aspect of ICT has impacted significantly on civil, economic and political relations. Coinciding with the advent of social technology was

a theoretical shift in international relations scholarship to considering issues of power as socially constituted rather than primarily material.

The combination of these factors contributed to the emergence of the second dominant paradigm for understanding the relationship between power and technology in international relations – referred to here as the "information-age" approach. This approach encompasses a lot of the theoretical shifts which have arisen to challenge realism, material power and the immutability of the state. In addition, it often exhibits a determinist approach to technology – one which regards technology as imbued with values (democratisation, freedom of speech and transparency of government or conversely, invasive surveillance and lack of personal privacy). It generally regards the internet as anarchical, user driven and beyond the dominance of the state. Essentially, this is a view characterised by change and re-evaluation of power in which ICT more broadly is frequently cited as a catalyst or even the driving force for those changes. This view engages with new technology and generally regards it as breaking down old power structures by redefining both the players and the playing field of international relations. However, it often does so without engaging adequately with technical issues leading to utopian or dystopian readings – dependent largely upon the perception of which values – positive or negative, reside in internet technology.

Two broad questions have preoccupied the academic debate addressing these issues. First, scholars have worked to understand how technological change has impacted on power relations between individuals and the state (or the idea of the state) (Smith and Naim 2000, Drezner and Farrell 2004, Slaughter 2004) and second, what implications those changes have for conceptual approaches to state power (Nye 2002, Aronson 2002, Hachigian 2002). Many studies have concentrated on the manner in which social technology has impacted on state

power by eroding or undermining the institution of sovereignty. The general emphasis in these debates is that social technology is dissipating power from the state in a variety of ways. Prominent among these is the proliferation and organisation of non-state actors which compete for power with states and the challenges of state control over extra-territorial issues which stem from interconnected networked systems (Castells 2000, Langman 2005).

A dominant concern for theorists of social power is legitimacy (Lebow 2005). Through an analysis of the US neo-conservative approach to power, Christian Reus-Smit (2004) concludes that social capital is an integral element of political power and effective influence relies on social legitimation. Although a social view of power can be understood independently of technology – either old or new – social technology has significant relevance for issues of legitimacy, "soft power" and other social aspects of power in international relations. A 24 hour news cycle, unrestricted access to satellite footage, and the rapid dissemination of information and images have intensified awareness of state behaviour and made it much more difficult for states to conceal events detrimental to their international standing. As demonstrated by the mobile phone generated images of torture inside Guantanamo Bay and the Wikileaks release of diplomatic cables, states have difficulty escaping surveillance even in the most remote and guarded situations. Thus, intersubjective relations between states are heightened by social technology and outcomes are difficult to subvert to capabilities in this context.

For these scholars, changing ideas about power and emerging technology combine to bring about a substantially changed system, transforming from one comprised simply of states to one comprised of multiple and diverse actors (Nye 2002: 60). In this new system, states are relinquishing or losing control with obvious implications for the relationship between technology and power.

While these studies make a significant contribution, they do contain impediments to a richer understanding of how new technology interacts with power. In explicating the manner in which state power is undermined by new technology, this literature frequently fails to make informed distinctions between aspects of the technology which are the consequence of state decisions and those which are beyond the immediate control of states. Of particular relevance here is Donald MacKenzie and Judy Wacjman's observation that technological determinism "focuses our minds on how to *adapt* to technological change, not on how to *shape* it. It removes a vital aspect of how we live from the sphere of public discussion, choice and politics" (MacKenzie and Wacjman 1999: 5). This leads to a focus on "adaptation" which has been a dominant feature in recent work attempting to understand political change in the context of the internet. Although there are some intractable technical issues which pose real challenges to state power, there are no natural or scientific laws which make it imperative that the internet function in the way it does. By failing to make accurate distinctions between what states choose and what they have imposed upon them, this "information age" view relies upon a technologically determinist approach.

Both the industrial age approach and the information age approach are able to contribute to understanding the relationship of ICT to power in international relations. However, although technology infrastructure and the use of ICT applications to enhance industrial power are significant, the complexities of state responses to social technologies such as the internet necessitate a broader approach which moves beyond 20th century conceptualisations of power in the international system. A social view, which places the role of information, culture, identity and knowledge at the centre of its analysis, is able to engage with the more complex and compelling issues. Despite this better conceptual fit, the polarising

debates within this literature about whether ICT enhances or diminishes state power coupled with the prevalence of a technologically determinist approach also place limits on theoretical development.

The Social Construction of Technology

Having introduced the basic premise of the social construction of technology (SCOT) in part one of this chapter and having demonstrated that existing approaches to the relationship between technology and power in international relations literature are failing to accommodate new social technologies like the internet in part two, the third part of this chapter will explain in some detail how a SCOT methodology can be applied to the study of the relationship between power and technology in international relations.

The social construction of technology is fundamentally about looking beyond the impact of a particular technology on society in order to understand how society itself shaped the evolution and adoption of that technology. The following four concepts are essential to understanding and employing a social construction of technology methodology and they also provide a means of conveying how this methodology can be implemented in a study such as this one.

"Interpretive flexibility" refers to the understanding that there were *alternatives* to the design of a particular technology (Pinch and Bijker 1989: 40). In other words, there was no natural law or predetermined outcome for a technological development. Rather, the manner in which it was perceived and responded to played a role in shaping it. Interpretive flexibility is linked to priorities and allows for an analysis of how changes to priorities may influence both how technology is interpreted and how it continues to evolve in a design sense.

In the context of internet technology as it relates to ideas about US power, interpretive flexibility is a key concept in understanding how changing political circumstances have impacted upon the technological evolution of the internet. Over the course of its development, there have been a number of unintended consequences – both positive and negative – of internet technology. Questions about how these second and third order consequences have been perceived politically leads to insight into values and priorities held externally to the technology itself – values and priorities which interact with technology but are not a direct product of it.

A second key concept is that of **"closure"**. Pinch and Bijker define closure in technology as "the stabilisation of an artefact and the "disappearance" of problems (Pinch and Bijker 1989: 44). In other words, it is not necessary to "solve" problems – rather closure relies on key social groups regarding the technology as stabilised. A particular technology then, may achieve closure through social rather than technological means by redefining the problem or through the transfer of power to a social group which disregards that problem. Closure is a social construct and is a significant factor in understanding the relationship between technology and the human condition.

Understanding how US politicians regard the resolution of a range of "problems" with the internet is essential to an analysis of its relationship to US power. In a SCOT approach, problems with the internet exist only if the relevant social actor believes they do. Some problems may be tolerated because of the advantages they provide or because immediate solutions would transgress other firmly held beliefs or values. This is illustrated by the range of state approaches to censorship on the internet – something which is regarded as inappropriate in the United States where values of freedom of speech and access to information are highly

valued social norms. Other problems arising from the internet may pose difficulties for some actors but not others. For example, credit card transactions over the internet favour banks over vendors but collective apprehension about the (in)security of banks reinforces that problem. Finally, closure can be achieved by *redefining* the problem – an approach which proves relevant in an examination of changing American strategic priorities and views of power.

A third SCOT concept of relevance to this study is the **"reverse salient"**. Thomas Hughes (1989: 73) defines a reverse salient as "components in the system which have fallen behind". They create lag and are often considered points of weakness which must be addressed before the system as a whole can effectively develop. Reverse salients are of particular significance to a large technical system like the internet and Hughes suggests that they can often be points of innovation. However, when reverse salients cannot be corrected within an existing system, they can lead to the evolution of a competing system (Hughes 1989: 75). This concept underlines the notion that systems are not pre-determined to either success or survival.

Reverse salients are important to this study because they can help to identify issues which are understood to impact negatively upon US power and help explain responses to those perceived weaknesses. This will lead to questions in the study about how US politicians understood reverse salients in the context of internet technology and how those perceived reverse salients translated into policy and legislative responses. There is nothing naturally definable about reverse salients. Rather, they are a product of priorities and perceived goals and as such, they can reveal much about the views of the social group – far beyond the technology to which they relate.

One final concept which will be integral to the methodology of this project is that of the **"relevant social group"**. SCOT deals with the subjective and as such it is necessary to be clear about the source of subjectivity. Some SCOT studies focus predominantly on this issue – seeking to ascertain who exactly the relevant social group is and how it influences and shapes technology. In some cases, the relevant social group is found to be other than that which was expected or anticipated in which case this variable leads to insightful findings.

However, in this study the relevant social group has already been defined as US political decision makers. While the study acknowledges that there are a wide range of social groups who have influenced and shaped the internet in profound and important ways, this particular social group is considered here to be both highly relevant and under-researched. In studies of the internet there is a tendency to define the relevant social group as either the broader community, the commercial sector or the technical community (which is generally understood to privilege the best interests of the other two groups). This project is an attempt to bring the state back in to these debates. In order to research the manner in which ideas about US power influence internet technology, this study will focus on those ideas which emanate from the state apparatus through policy documents, key speeches, legislature.

In an attempt to move beyond the previously articulated competing paradigms, this project proposes a deeper engagement with the *relationship* between new technology and power. Rather than assess these issues exclusively through a determination of the positive or negative effects of technology, this study asserts that the internet both enhances and undermines state power in complex and important ways. The SCOT concepts discussed above generate a set of questions which move beyond the conceptual and empirical stalemate of whether ICT enhances state power more than it undermines it or vice versa. Asserting that there is nothing

determined or fixed about either of these outcomes, it moves on to more enlightening questions about how political ideas and technology interact.

Criticisms of SCOT include the assertion that it reduces technology to simply another form of cultural expression, along with art and literature. Also, as Vig points out, the "chain of causation between social context and technology is difficult to establish" (Vig 1988:16). However, the first criticism is only an issue for those studies which are primarily concerned with the development of technology. This study is not compromised by an understanding of technology as a form of cultural expression – indeed, such a reading is fundamental to the conceptual framework here. Second, causation *is* difficult to establish but this study does not assert that ideas of power *caused* the internet to develop in the way it has. Rather, it seeks to better understand the *relationship* between ideas of US power and internet technology in an intersubjective manner. Ultimately, this project takes the position that a meaningful understanding of technology cannot be achieved in abstraction from its human context.

The empirical research for this project is underway through the following case studies. Each of these periods brought with it a range of technical and political factors which interacted to shape internet technology and these are currently being examined using a SCOT methodology.

Case Study One – Developing it: TCP/IP and the Expansion of the Internet (1960s to early 1980s)

Established in 1958 in response to the Soviet launch of Sputnik, Advanced Research Projects Agency (ARPA) was charged with ensuring the US maintain a leading role in the application of state of the art technology to military capability. With a view to connecting large

computer systems in order to maximise their capabilities, ARPA began to fund and support work on networking protocols both from within its own research institute and also through funded association with key computer scientists working in academia. As work progressed, more specific applications were conceptualised including the establishment of a secure communications system necessary to enhance the United States' second strike capability in the event of nuclear attack. Although there were alternatives (Clark 1988), the technology adopted in response to ARPA's requirements was the "transmission control protocol/internet protocol" – or TCP/IP – the foundational technology of the internet developed by Vinton Cerf and Robert Kahn.

Superficially, the development and implementation of TCP/IP technology to address ARPA's priority of providing a more robust communications system can be understood within the paradigm of nation-state power. However, throughout this design phase, security of the network and accountability appear to have been low priorities - possibly due to the fact that access was restricted to defense, science and academia. TCP/IP was conceptualised from the beginning as an open and flexible architecture which ultimately provides a rich environment for both innovation and exploitation. Given that the code prioritises redundancy and flexibility over security and accountability, how did ARPA and US policy makers conceptualise the impact on American power of making the internet globally available? How did ideas and expectations about the future direction of American power coalesce with the internet transforming from a communication system designed to protect and enhance US military capability to a global system open to the ideas, innovations and requirements of a broader community?

Case   Study   Two   –   Expanding   it: Commercialising   the   Web
(mid 1980s to late 1990s)

The second research phase for this project covers the mid 1980s to the end of 1990s. During this period, the internet was commercialised and became widely accessible. Initially distinguished by the rapid growth in email traffic, the defining technological development of this phase was arguably the emergence of HyperText Transfer Protocol (HTTP) and HyperText Markup Language (HTML) and their application to the development of the world wide web largely credited to British physicist Tim Berners-Lee. The subsequent commercialisation of web browsers which provided a user-friendly graphical interface was instrumental in the widespread take-up of internet technology. This period covers the "dot-com" economic boom and bust, transformation of news media and developing notions of the democratising potential of the internet. The rapid escalation in use of the internet during these years brought the US face to face with difficult decisions about whether or how to loosen their grip on controlling factors such as the assignment of names and numbers, the development of a legal framework which balanced freedom of speech and privacy of the individual with national security issues, the encryption debate, and how to manage the global spread of the physical infrastructure of the internet.

The political context for these decisions was distinct from that of the first phase discussed previously. With the Cold War over, small government was in and economic power was coming to be regarded as an increasingly significant aspect of foreign policy strength. President George H. Bush's foreign policy doctrine was premised on a "new world order" which projected a period of peace and stability founded upon the predominance of liberalism, free markets and the rule of international law. The Clinton administration followed up by

emphasising American global economic leadership based on free markets and projection of an enlargement policy which promoted democratisation and human rights. The dominant political paradigm of liberalism, free market force and minimising government provided an ideological platform for US decisions to disallow any state led governance structure for controlling the internet during this critical period of growth. Former vice-president Al Gore was a key political force during this period introducing the *High Performance Computing and Communication Act of 1991* while still a senator during the Bush Administration. The passing of this bill had a number of important affects on the development of internet technology including the funding of the first commercial web browser, Mosaic and the establishment of the National Information Infrastructure (NII). Significantly, the NII was legislative acknowledgement of a view which would become increasingly important in emerging ideas of state power and its relationship to new technology – the notion of information as a form of state power.

These views largely resonated with prevailing ideas of US power. The emphasis on less government left the internet to govern itself, market forces would ultimately prevail and result in a healthy and stable system, the internet could have a democratising effect similar to economic factors and the positive economic impact of the IT boom reinforced the mutual and symbiotic benefit of this approach. However, the problems of security and accountability across the network were both increasingly apparent and intractable. The economic bubble was about to burst, and state to state conflict was about to be overtaken by wars of asymmetry and disruption. How had the decisions taken during this stage prepared the United States for the problems to emerge in the new millennium? To what extent were ideas about the relationship between US power and new technology dependent upon the positive outcomes of the 1980s and 90s? How were these ideas challenged, reinforced and/or amended during the years to

follow? And how would changing ideas about American power influence the way internet technologies further developed, especially in terms of geopolitical security issues and international codes of conduct?

Case Study Three – Controlling it: The Changing Role of the ISP (the previous decade)

The third period covered in this study looks at changes to ideas about US power and technology since 2001. The foreign policy doctrine of George W. Bush was initially conceived in terms of a selective and discriminate national interest to be pursued through enhanced military capability. This doctrine was comprehensively articulated in a *Foreign Affairs* journal article written by US Secretary of State, Condoleezza Rice (2000) and by US Secretary for Defense, Donald Rumsfeld in the 2001 *Quadrennial Defense Review Report* (2001). However, post 911 this was significantly reworked with the new strategic framework fundamentally based upon a more expansive view of the American national interest which now faced a range of emergent globalised threats less responsive to conventional military power (Jervis 2003, Rumsfeld 2006). Changing conceptions of conflict, the role of non-state actors, the doctrine of pre-emption, high-tech versus low-tech, asymmetry and the erosion of some aspects of geopolitics have all came to the fore in this phase. Changing ideas about US power have had significant implications for changing conceptions of the internet - from a system largely driven by fundamental tenants of economics and democracy to one more focused on the vulnerabilities of misuse and disruption.

In the political context of the "war on terror" which subverts conventional sources of power and elevates social power, the internet takes on new meaning. The rapid migration of

information systems connected to the internet during the course of the late 1980s and 90s made internet commentator John Perry Barlow's insistence that "you of the past leave us alone" (1996) less tenable now that 1.5 billion people or 23.5% of the world's population are now online - as well as 85% of US critical infrastructure (Internet World Stats 2008, Deloitte Touche Tohmatsu, 2004). Some of the previously acknowledged vulnerabilities of the internet have enhanced relevance in an era marked by unconventional threats from determined individuals. The growing realisation that universal software platforms like Microsoft Windows and the Office suite are highly vulnerable - particularly when coupled with the open architecture of the internet - highlighted a range of possible threats to the state (Geer et al 2003). The cross jurisdictional nature of cyber-crime which may be committed from a state with laws divergent from the state in which the crime actually occurs, greatly complicates the exercise of power (Krebs 2007). Certainly, one of the distinguishing features of the internet is that it remains difficult to moderate behaviour through conventional institutions and regimes such as state or international law. Given that some unintended or unanticipated consequences arise from the adoption and implementation of new technology, how has the United States responded and how have changing ideas about US power influenced this phase of internet development?

In some ways, the original military approach to the internet which drove development in the 1960s and 1970s has risen again to prominence during this period. The Department of Defense has increasingly focused on cyberwar or infowar strategies and doctrine, largely through a dedicated unit within the Airforce which now regards domination of airspace to include cyberspace. A US congressional report published in 2006 notes however, that reciprocating against a cyber attack may lead to "possible accusations of war crimes if offensive

military cyber-weapons severely disrupt critical civilian computer systems, or the systems of other non-combatant nations." The report concludes that the US Department of Defense believes that it lacks "sufficient policy and legal analysis for guiding appropriate responses to intrusions or attacks on DoD networks." (Wilson 2006: 5). Increasingly, the United States faces a "strategic paradox" whereby it is forced to balance the often contradictory computer security requirements of its economy with military strategies which increasingly involve the capacity to disrupt the infrastructures of rival nations (Rathmell 2003). Additionally, cyber-espionage has become a significant issue with many allegations directed against China – arguably America's key strategic challenger. With the expected democratising effect of the internet still to eventuate, the US has instead focused attention on China's use of the internet as a weapon and as a tool of suppression – notably the US Congressional hearing into Yahoo over the divulgence of the contact details of a Chinese journalist charged with revealing state secrets (Kahn 2005, Marquand 2005). This takes place in the context not of the closed system of ARPAnet, but rather in a globally accessible and open network which necessitates a modified approach to that employed during the 1960s and 1970s.

Changing ideas about American power impact on conceptions of the internet and in this phase, the disruptive capacity of the technology has increased resonance leading to a "re-militarised" view of the internet. This re-conceptualisation allows for a range of policy discussions which would have been difficult during the previous phase including those surrounding the need to rebalance the security/privacy aspect of the internet (R. Mueller 2007, Singel 2008). It also leads to a paradox. How does the US reconcile a re-militarised approach to the internet with suggestions that internet challenges are not particularly responsive to military power? How has the re-conceptualisation of US power influenced the progressive

development of internet technology since 2001? How has the United States sought to minimised internet vulnerabilities in the context of an expanded view of the US national interest? How has the national security community responded to and influenced changing perceptions about the internet? And finally, what future consequences for state power does the US anticipate in relation to the internet?

Conclusion

In summary, then, this chapter proposes that a more engaged and conscious approach to technology needs to be integrated with international relations theories of power in order to better understand the relationship between power and technology. In attempting to move beyond the debate in international relations about whether new technology like the internet enhances state power more than it undermines it, the philosophy of technology provides a conceptual framework for better understanding the intricacies of the relationship between the political and technological realms. Specifically, the social construction of technology allows for the analysis of the ways in which states seeks to shape and influence emerging technology and also the manner in which changing technology can impact on political ideas. This leads away from a simple quantitative equation to a more complex reading of how political processes are affected by and also impact upon the evolution and implementation of new technology like the internet. Ignoring this complexity can lead to an over-simplification of important issues and questions. Asking and answering these questions is essential to the development of theories equipped to deal with the relationship between power and technology in the information age.

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