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I. Technology Assessment: Democracy's Crucible for the Future Endorsement of Science and Technology in the 21st Century.

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Technology assessment [TA] has been known by different definitions down through the years and it is possible that the failure to secure a uniform definition lies in the differences that social scientists, classical scientists and the general public have about its core elements. Of course, another key issue is that open and democratic societies seem to favor the practice of technology assessment, despite variable ideas about what it means while more restrictive societies, with strict cultural and political sanctions on freedom of expression, tend to oppose TA. For our purposes, we should try to outline a workable definition which is symptomatic of a highly innovative, technologically acquisitive and scientifically robust society where political democracy and commercial entrepreneurship go hand in hand.

We should be prepared to provide a definition that reflects current reality and is expansive enough to encompass the next 25 years of political and technological development, swaying precariously between the extremes of reckless democratic expressionism and rampant materialistic nihilism. So what is Technology Assessment?

> *Technology assessment is the systematic evaluation of innovative, novel and unique discoveries and developments in all fields of science and technology to examine both the immediate and long-term societal, political and ethical impacts of new ideas and advancements to ascertain whether their net impact is either positive or negative. It also estimates any expected or unexpected outcomes which could result from, or be triggered by, these new ideas, advances, discoveries and developments.*

Those vehemently concerned about TA, both historically and in contemporary times, may hold visions of modern day Luddites staunching every innovation or new scientific breakthrough because it contains an unknown level of risk to social stability. They point to Galileo and Copernicus, full of passion in defense of the pure pursuit of scientific knowledge, and quickly assert that all human progress is the direct result of scientific or technological innovation in one form or another. We can be proud of innovations in robotics, nanotechnology, genetic engineering, computer science and other fields. However, the reciprocal caution we clearly understand with crude technical insights is that new history making technologies bring unexpected costs as well as benefits. Democratic societies should exemplify and reflect the delicate balance between science's desires and society's needs—science wants free reign to create and explore to open new frontiers while society wants benefits and progress without adverse or inadvertent consequences.

In the spirit of TA's original purposes we must consider its societal impact, negative political or economic consequences, the inadvertent triggering of new risks or unforeseen secondary hazards, while systematically examining the overall benefits and disadvantages of any new technology on our community's security and safety. Open and democratic societies understand the crucial nature of this balancing act and will seek reasonable methods and mechanisms to undertake serious technological forecasting.

With the advent of carbon-based industrial processes, developments in atomic energy, and the creation of synthetic materials resistant to biodegradation we were grimly

brought face-to-face with profound new societal, political ethical and environmental challenges containing unknown or ambiguous downstream risks and consequences. We are still trying to tackle the unintended outcomes of these breakthrough technologies many years after the new technology was unveiled. So we are not arguing against technological progress or innovation and fearless exploration of the unknown. Instead we argue that by displaying pragmatic caution, leaving room for reasonable doubt, and examining the downstream societal, cultural and ethical consequences of new technologies we avoid the Faustian bargain of endorsing something shiny and novel in exchange for absorbing its ambiguously malevolent properties. By weighing not only the benefits and advantages derived from new technologies but also grasping their less well understood, and sometimes latently harmful, and often subtly negative consequences we have purchased a gift of enduring value. Using a strained allegory here--It's not that progress cannot travel forward in time with society as co-passengers in a jetliner, instead a security check is needed before we board the aircraft to ensure that all passengers on the flight into the future pose no risk or inadvertent threat to each other on the journey.

Before we find ourselves poised to blindly accept, hesitantly embrace, or vehemently oppose new discoveries in science and technology we will need the benefit of facts and a willingness to provide a wide berth for critical analysis. Every advance in technology has admittedly breathtaking elements which hijack our imagination and pragmatic reserve long enough that our 'gee whiz' rapture gradually overtakes any sentiment we may have lingering that the gizmo in our hands, or the one driving our national aviation infrastructure, is benign at worst. We are fascinated with new technologies, breakthroughs in biomedical sciences that save or prolong life and handy 'societal software' that makes overall life easier and less prone to drudgery. So we say—bring it on—let the consequences be damned. Or we say, let's play with this thing long enough that we know with confidence it won't inadvertently harm or kill somebody. In accepting the blessings of nuclear power one also tacitly accepts in exchange the risks of a catastrophic radioactive emergency.

Examining the Risk Frontier

We face exciting and terribly beneficial discoveries in biotechnology, nanotechnology, plasma physics, materials science, space science, propulsion dynamics, artificial intelligence, cyber-engineering and other fields just to name a few. The tsunami-like wave of commercial endorsement for these discoveries and advancements is impossible to thwart, even though many would argue that stifling obstacles in funding, restrictive boundaries on cutting-edge research domains, and enduring hurdles for new inventors threaten to keep us from leap-frogging to a much better life and economy. What is missing? It is the mechanism by which society, government and our major cultural institutions examine and experience newly emerging science and technology—*simply put we have no mechanism sophisticated enough, clear enough, and sensible enough to permit the comprehensive and objective endorsement of future technologies*.

As a result, we find ourselves in an uncomfortable and untenable position. We are forced to trust scientists, and our massive commercial-industrial infrastructure with the task of *not only producing the great new breakthrough product*—but providing government and society with ironclad assurances that the immediate and long-term consequences for society, our political system, and our porous ethical standards will be

benign at worst. While it may seem that what TA really wants is greater regulation, stricter oversight of commercialization, tighter safety controls and programs to safeguard society by sharply restricting the release of new technologies that is not the goal. Nor is TA clinging to the notion of universal industry wide pledges of ethical conduct and personnel reliability programs to curtail unethical behavior among manufacturers or scientists. A serious discussion of safeguards and risk reduction is warranted.

The central problem is that no widely accepted, objective, reasonable and enforceable system exists for TA—*simply put we lack a reliable TA mechanism at the very time in our fragile social and political history that one is deeply needed*. This dilemma will hardly find adherents in most of the commercial world because such efforts will be seen as imposing a net market disadvantage on American goods, technologies and products in which other nations care not engage. The United States must assess how, and to what extent these TA issues will impinge on WTO agreements, world trade, market competitiveness and salutary profit-taking because the economic costs of investing in TA will be considerable. We cannot afford to forget how we accepted auto seat belts, poultry inspectors, and financial disclosure statements as part of daily life and made them instrumental to reinforcing those aspects of an otherwise free democratic economy we apparently cherish.

Major Areas of Concern

The lack of a viable TA mechanism that earns the support of scientists, the public and the media is especially troubling, as we delve more deeply into the era of scientific experimentation and exploration in domains of high excitement and fascination—biotech, cybertech, nanotech, and hyperspace for example. In each of these exciting domains the green flag of welcome progress continues to fly proudly, yet there remains no system in place for systematically assessing whether we understand the downside risks and outcomes that may indirectly or inadvertently result. This dilemma obtains for many advanced technologies to be sure, but there are a special few which come closer to covertly containing risks of unraveling our societal and political fabric than most others. A handful of revolutionary technologies in our midst deserve some closer scrutiny and consideration because they contain a high risk of dangerously adverse consequences.

Of course, these advanced technologies include fundamental risks such as: [1] their inherently dual –use character in that any one of them could potentially be exploited for weapons use or to inflict harm; [2] unforeseen risks that the technology will trigger cascading downstream effects inimical to society and culture; [3] unknown risks that arise when new technologies are blended with well known technologies and the result is destructive or dangerous; and finally, [4] the new technology becomes a gateway to new societal risks only dimly understood in the same manner that cybertech looks like the path to a more efficient world so long as the very real risks of cyber-terrorism are ignored.

This must be of special concern to everyday citizens and scientists alike because new discoveries contain unknown risks and often these are not systematically examined. We tend to tilt towards recognizing the benefits while ignoring the benign risks. For example, the search for an atomic weapon preceded the quest for nuclear power while laser technology for medicine preceded development of airborne lasers for military use. We understand that possession of atomic weapons reflects the most potent strategic

military leverage on earth as of today but we have no ironclad guarantees that a new more lethal technology cannot be eventually discovered either as a rival, offshoot, or alternative mechanism of widespread destruction. It is possible to imagine a post-atomic weapon that equals, nullifies or surpasses the atomic bomb and which grants devastating destructive power to its owner and alters the globe's security apparatus.

We have procedures and some consensus on biosecurity, safeguards and other related notions designed to protect society against untoward discoveries of new bioweapons or deadly pathogens. However, there is much work to be done and the global pharmaceutical and biotech world routinely does not welcome intrusion or regulation, although they appear committed to trying the newer biosecurity and biosafety measures being proposed. We must also remember that a small highly skilled cadre of bioweapons scientists could be covertly compelled by rogue regimes or terrorist groups to develop crude biological devices without regard to such safeguards, thereby raising the risks of deliberately inflicted pandemic for all nations.

Options for diverting legitimate advanced technology research into *weaponization* or misdirecting it for criminal purposes, are dimly understood and easily dismissed as near science fiction. However, it is much less clear in the cybertech world, the nanotech frontier and ongoing research into hyperspace possibilities. In each case advances in technology always bring us to a crossroads of ethical ambiguity.

Genetic engineering, synthetic biology and related biotech advances can allow scientists to manipulate the DNA, genomic structure and related properties of certain diseases. Undesirable traits can be screened out, propensity for certain illnesses can be reduced and healthier, smarter or stronger people can be developed through cloning. Robotics, bio-mechanical hybrids, self-replicating nanobots, and emerging excursions into nanobiotechnology make it even more difficult to sort out what new discoveries could produce. Harmless technologies benefitting society in ways never imagined is the hope—revealing new avenues to undermine and exploit humanity or society is the nightmare. Quite simply, we are victims of our own enchantment because the desire to discover breakthroughs trumps any serious concerns about downside caution let alone the trivialities of risk assessment.

What is Needed

It is not the issue of complexity that seems to steer us away from serious TA mechanisms. We have tried these imperfect systems before laden with political and very nonscientific hyperbola and fright-mongering. Congress had its own Office of Technology Assessment [OTA] for over 20 years ending in 1995, and efforts by the National Science Foundation, which predated OTA, both reveal a process flawed by competing political, economic and technical interests. What was missing was sustained political and scientific support for the notion of technology forecasting for its own sake.

What is needed is an explicit partnership between business, academia and government where the views of ordinary citizens are also considered. Genetically modified foods worked their way into the American diet almost clandestinely and were gradually accepted, not so in Europe. Little serious thought these days is now given to intensively examining genetically modified foods because they have been a part of our lives for more than 20 years. Downstream concerns about their generational effects,

legacy impacts on public health and their contributing role in cancer, or other diseases must be discarded as hypothetical and irrational. We tend not to investigate that which we have socially accepted even if engaging in long-term scientific analysis to assure our citizens might prove or disprove that belief.

So apart from the need to create an entirely new TA mechanism for the United States which exhaustively examines cutting edge technologies to ascertain their positive and potentially negative aspects, there is a corresponding need to engage inventors, venture capitalists, academicians and other experts in the task of designing a viable TA system which can prove itself able to discharge its two most important functions—[1] to clarify, reveal and advance promising technologies tagging them for special endorsement and investment; and then [2] to identify as much as possible the potentially negative and harmful effects of these technologies and how they may directly or inadvertently cause ill effects outside their intended areas of legitimate activity. We must show the way and demonstrate that such a process not only furthers science and technology but safeguards democratic society. But this is not enough.

Promoting the effective use of a TA mechanism outside the United States also makes sense and would contribute to global stability and security if it is managed properly. Just as the G-8 defines superpowers and the G-20 delineates prosperous economies we should seriously consider creating a G-35 group of the states with the most robust science and technology infrastructure. This G-35 group would devote its energies towards the evaluation of emerging technology anywhere in the world, garner support for its nascent development, examine and foster the trajectory for its advancement and safeguard it from nefarious manipulation into destructive outcomes or *weaponization* through a multilateral screening and evaluation mechanism. This will take many years and require the steady support and leadership energy of the G-20 membership, but it is not impossible or inadvisable. The emerging G-35 will become the world's next best mechanism for technology forecasting and thereby contribute to the tasks of counter-proliferation and development of new destructive weapons systems.

If we do nothing in either our domestic or international sphere, we risk finding ourselves awakening to a new era of destructive and devastating technologies which either came upon us my accident, by malevolent design or by coercive manipulation of scientific energy. With a robust TA mechanism in place we have erected a broader safeguard against new future weapons more damaging than the atom bomb, the laser or hypersonic wave. We have purchased a measure of peace and bought precious time to allow existing and future democracies to flourish.

In many ways, the construction of a robust TA mechanism is democracy's crucible for filtering out destructive and inadvertently damaging technologies while ushering in an era of thoughtful, objective and analytical assessment of emerging technologies in terms of their direct benefits to society. We can measure the harmful effects of existing technologies by looking at their impact on our environment, public health, national security, and overall livelihoods.

II. A Historical Mandate for Expanding Broadband Internet Infrastructure[1]

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Introduction

In his article, "The Press, Post Office, and Flow of News in the Early Republic," Richard B. Kielbowicz explains that the history of the Post Office is a curious one. Critics of government wanted a Post Office so that their publications could be widely accessible, reporting to all about the inefficiencies of government. The Federalists also wanted a Post Office, given its help in maintaining a centralized government. In this sense, then, a United States Post Office was widely accepted and desired, despite the costs of implementation. At base, Kielbowicz argues that the development of a free press was itself a crucial goal in the justification and creation of the Post Office.

Today, technology, increasing costs of transportation, and environmental considerations are moving newspapers to the electronic realm (Alterman 2008). In the present paper, I will argue that the reasons why the United States' founders wanted government postal offices and roads are today reasons to want expanded broadband Internet infrastructure. People currently can electronically send letters, read the news, pay bills, access government services and tools, receive emergency messages and broadcasts, watch videos of presidential addresses, and more, all through the Internet. As I will show in what follows, figures as important as George Washington, Thomas Jefferson, James Madison, and others all thought that the free flow of information should be maximized for the sake of a virtuous democracy, one in which people are as free as possible to learn about public concerns, the actions of government, and the avenues available for addressing their problems.[2]

The argument I present is important because of how difficult it can be to justify public expenditure. Among the first motivations that the American revolutionaries and founders had for seeking independence as a nation was the rejection of taxes. Taxes on the colonists were levied not simply for the purposes of governing the colonists, but for the benefit of England. The fact that colonists were not represented in government added fuel to the fire against unjust taxation. Still today, many Americans conceive of the national spirit as calling for the minimization of government. Government is considered a necessary evil, one to be kept small.

Some twentieth century scholars, such as Milton Friedman, believed the evil of having to take money from people without their considered and explicit consent comes to nullify and even outweigh the positive consequences of government spending. Libertarians carry the spirit of the revolutionaries forward as a guiding principle for American government.

With the anti-tax spirit in mind, critics of new government spending frequently ask how legislators intend to pay for their proposed programs. Given the challenge of securing public funds in a way that many citizens accept willingly, few expenditures escape the dilemma of how funding will be secured. In general, most universally accepted spending hinges upon the obvious necessity of the spending for the basic operations of government. For instance, military spending in the United States is enormous, yet is rarely criticized as a form of expenditure among even the greatest advocates for smaller government. After all, without national independence and security, other social efforts would be impossible. Similarly, for the sake of our form of government, a free press was deemed necessary. To distribute both government communications and the news to citizens and government offices, it was clear early on that government would have to support a Post Office. Surely industry could be helpful where there is the greatest benefit to private interests. In low-population regions, however, industry simply does not have enough

incentive on its own. Nevertheless, government and democracy require the free flow of information.

The critics of the Post Office emphasize economic and moral concerns. The former challenged the monopolization of mail services and the latter disapproved of the mailing of pornography and other materials deemed immoral and undeserving of government support. Challengers for my argument for expanded broadband Internet access based on postal provisions in the Constitution will likely raise these questions as well. Before addressing these concerns, I will review the U.S. Constitution's remarkably brief statement about Congress's permission to establish a Post Office. Then, I will lay out some key arguments that the founders advanced to justify the need for the maximally free flow of political information. Finally, I will offer some initial responses to anticipated criticisms of my argument.

The Constitution, the Post Office, and Today's Postal Roads

Article I, Section 8 of the U.S. *Constitution* proclaims Congress's power to raise taxes and perform certain duties. It states:

> *The Congress shall have Power To lay and collect Taxes, Duties, Imposts and Excises, to pay the Debts and provide for the common Defence and general Welfare of the United States; but all Duties, Imposts and Excises shall be uniform throughout the United States; ... To establish Post Offices and post Roads;*

Although the details listed here are sparse, the Constitution is unambiguous about Congress's power create the infrastructure necessary for the conveyance of letters and newspapers.

Today, many media are available for communicating news expeditiously. I argue in this paper for broadband infrastructure since radio, television, and telephones can each be transmitted with the help of Internet connectivity. Thus, should the government decide to expand broadband Internet access, it would also lay the foundation for expanded telephone, radio, and television connectivity in locations where these are unavailable or prohibitively expensive. Consider that in the populous and comparatively wealthy state of California, one town received telephone service for the first time in 2008 (Norris and Siegel 2008), a testament to the fact that industry lacks the incentive on its own to maximize the avenues of political communication with regard to more remote regions. Expanded broadband Internet access would serve several purposes.

The Founders, the Press, and the Post Office

It is commonly believed that larger government involves tyranny and European social tendencies that at least many Americans do not wish to emulate. As such, it is important to consider some founding American voices in evaluating the arguments I present here. I then end this section with reference to the postal service of the Confederate States, which also took the postal services to be vital public goods. I do this given the Confederates' general desire to avoid the federal, centralized control that the Union represented.

A crucial revolutionary leader, George Washington, wrote in an address to be delivered before Congress that "I need not say how satisfactory it would be, to gratify the useful curiosity of our citizens by the conveyance of News Papers and periodical Publications in the public vehicles without expence."[3] Washington believed so thoroughly in the "importance of facilitating the circulation of political intelligence and information" that he advocated against charging newspapers a fee for their delivery (Richardson 1897-1917, I, 120).

Aside from Washington, James Madison was another great advocate for expansive postal service for the purpose of rapid, cheap, and evenly priced postage for the dissemination of political information and news. In a 1792 letter, he explained his view that "In such an [sic.] one [government] as ours, where members are so far removed from the eye of their constituents, an easy and prompt circulation of public proceedings is peculiarly essential" (Madison 1792). The argument for substantial and quick transmission of public information has several parts. First, a populace ignorant of public problems could not participate as meaningfully in government as one that is informed. At minimum, then, information should be maximally available to allow for a more informed public. Also, if public officials act against the public interest, but without the dissemination of public proceedings, citizens would not know of their actions. Thus, the demand for transparency and accountability in government calls for the greatest dissemination of information possible.

Lesser known figures articulated the arguments for enhancing the free flow of information also. Massachusetts Congressman Shearajashub Bourne argued that "Newspapers contained general information, and ought to come to the subscribers in all parts of the Union on the same terms" (Annals of Congress 1791, 285). Bourne's fellow Congressman Elbridge Gerry of Massachusetts supported what Kielbowicz (1983) called the "unencumbered flow of information throughout the body politic" (258). Congressman Gerry wrote

> *That wherever information is freely circulated, there slavery cannot exist; or if it does, it will vanish as soon as information has been generally diffused… However firmly liberty may be established in any country, it cannot long subsist if the channels of information be stopped; instead, therefore, of taking any steps that might tend to prevent the diffusion of political information, the House ought to adopt measures by which the information, contained in any one paper within the United States, might immediately spread from one extremity of the continent to the other; thus the whole body of the citizens will be enabled to see and guard against any evil that may threaten them. (Annals of Congress 1791, 289).*

At the time that Gerry was writing, Congressmen could not have imagined the amazing rapidity of the flow of information that is possible today. As Gerry calls for it, today we can in fact "immediately spread [information] from one extremity of the continent to the other," far faster than ever before imagined (ibid.).

It must be noted that the great debate in Congress was less over matters of whether or not to have a Post Office than about how much to charge for it. It was largely taken for granted that it would be necessary to have such an office and postal roads. Consider the analogous development of the highway system in the United States, established in part for reasons of military defense, yet used for countless purposes beyond. In the case of the postal service, the matter of how to set the costs of services was crucial, however. In cities, private companies had a large and consolidated market for the delivery of letters and newspapers. As such, newspapers from cities had a great advantage over newspapers from rural communities. Also, while private companies would deliver mail affordably within highly populated areas, small communities were ignored altogether or might have to pay great sums of money to have their post delivered to them. Each of these issues was considered in the development of the Post Office, including economic matters of freedom and competition (Rogers 1916, Rich 1924, Kelly 1932, Kielbowicz 1983).

Different concerns arose about rural news sources. On the one hand, where newspapers from large cities were more expensive to ship to rural communities, rural news outlets were more

competitive, given the lower costs of delivery. On the other hand, rural newspapers had a drastically limited market, given that their papers could not be delivered cheaply to the cities. Representative Robert Barnwell of South Carolina wrote that "country papers are important on many accounts, and ought to be encouraged" (Annals of Congress 1791, 285). As Kielbowicz (1983) explained, "Structuring postage rates to make newspapers from distant locations more expensive insulated rural publications from ruinous competition, many policymakers believed" (259). Therefore, postage rates that were graduated according to distance traveled, rather than being the same everywhere, were seen as impediments to competition, not as a proper reflection of free market principles. Current arguments over postage rates also raise these issues.

So far the authors listed here fit mostly on the side of the Federalists. The Republicans at the time favored low postage rates as well. According to Kielbowicz (1983),

> Republican editors predicted that a 'tax' of once cent or more would curtail newspaper circulation among all but the wealthy. This would have the effect of permitting only the'rich and BETTER SORT' to monitor and criticize the affairs of government" (263, citing Stewart 1969, 460-463)[4]

Here we see the fact that even anti-federalists were supportive of the initiative to maximize the free flow of political information. After all, anti-federalist newspapers wanted maximal distribution of their critiques of government, made as affordable as possible so that the poor as well as the wealthy could learn about and participate in government.

In closing the present section, it is worth noting that even the Confederacy had its own postal service, documented in Dietz (1929). In a time that Dietz called the "Stampless Period," he explains that some of the most "interesting, and withal valuable, privately prepared substitutes for stamps appeared" (29). The Confederate states had great need for the postal service and designed and employed a great variety of colorful stamps, many of which were labeled "Confederate States of America." It was obvious to the Confederate states also that public postal services were a dire necessity. According to Dietz, "On March 6, 1861, John Henninger Reagan, of Texas, was appointed Postmaster-General of the Confederate States." Dietz ends his prologue concerning the start of the Civil War and the development of the Postal Service of the Confederate States, writing that "strange as it may seem, tomes have been written on every phase of that epoch, yet none have attempted to rescue from oblivion the records of the *most essential department of a civilized government* [the postal service] and preserve for posterity the story of at least one success unmatched by any other modern state" (2).[5]

Concerning postage rates and differential costs, initial debates in the Confederate States called for differential postage rates when mail would travel more than three hundred miles. On February 21st of 1861, however, "Mr. Crawford moved to strike from the first section" of the postage bill the language which differentiated postage costs. The motion carried (Dietz 1969, 357). Thus, even in the Confederate States, the value of the affordable flow of information was deemed crucial and postage was kept at an even price, despite differences in distance that mail was to travel.

As we will see in what follows, critics today still challenge the limitations on competition in postal services, which would lead to varied postal rates. The Federalists, the anti-federalists, and even the leaders of the Confederate States believed that it is important for a society to level the costs of transmitting information for the sake of the public good. At the time, information was transported on paper primarily, and thus newspapers were the focus of the debate. It is by

analogy of these arguments that I will defend the need for the equivalent of postal roads for today's immediate free flow of information – broadband Internet infrastructure.

Analogous Fiscal and Moral Challenges

My aim in this paper has been so far to show the historical arguments and precedents available in the United States for expanding and maximizing the avenues and practices which enable the free flow of information. I am not arguing that Internet access must be offered for free to everyone. Rather, I would point out the fact that the remote locations in America are provided Internet access currently only with the help of satellite Internet providers. Satellite providers are among the most expensive kinds of connections, while yielding some of the lowest connection speeds in the high-speed category. My own experience in small town Illinois demonstrated yet another relatively rich state that did not have widespread access to the Internet just a few miles outside of town. The alternatives that the private sector offered were decidedly inferior in quality and more expensive, the same sort of circumstance as mail carrying in the early republic. Mail took longer to arrive and was more costly to transport to smaller areas in early America. The arguments I have presented imply a similar call for the free flow of information today via the Internet. As I have noted, more and more newspapers are closing their doors due to the costs of publication and the faltering economy (Alterman 2008). The remaining newspaper businesses in operation are those which distribute their publications to large audiences and those that are moving to exclusive publication online. A further reason to expand broadband Internet infrastructure is the increasing dependence of local governments on online resources, such as for licenses of various kinds, electronic communications, and more.

The American Enterprise Institute has for thirty years published criticisms of the postal service's monopolizing policies and limitations on private enterprise in the areas of postal letter delivery. Scholars representing the AEI argue against practices that stray from free market tendencies and principles (Sidak and Spulber 1996). Criticisms of the mail beyond those from the AEI have come from the moral angle. Those who would question the mail service for transporting pornographic and other offensive materials would likely challenge also the use of public moneys to support Internet infrastructure that might also be used for such purposes (Fuller 2003, 98). I will reply to both these arguments briefly to show the overwhelming value of maximally expanding the country's capabilities in the most advanced systems of contemporary communication – the Internet.

Haldi (1974) and Sidak and Spulber (1996) have been critics of the monopoly that the Post Office holds on the mailing of traditional letters. Haldi with the help of Joseph Johnston, Jr., points out the similar and troubling history in the United Kingdom of exclusivity provisions for mail carrying (4). Critics commonly argue that the freedom of carrying letters should not be abridged. Why limit their freedom? According to their theory, prices will drop with increased competition. The simple answer was evident already to the founders, however. Mail services within municipalities could become cheaper, and over long distances, prices would become prohibitive. Consider once again the fact that even in California phone service became available in 2008 (Norris and Siegel 2008). Telephones are primarily a means of private communication, not a mechanism for distributing news, however. If you allow private companies to perform letter carrying within cities and to lower prices, the public provision of mail service would lose the revenue necessary to keep costs low for all. In sum, the forces of competition do not lower prices everywhere. They would substantially increase the cost of mailing letters and packages to any rural location not proximal to a large municipality. The public benefit of allowing

competition in this sphere would be localized and the detriment would be widespread for rural communities. Also, since so much commerce occurs from a distance today, the more costly flow of goods and of bills and payments would be a disincentive to commerce, as the founders argued. Finally, the fact of special mail services, such as Federal Express and U.P.S., is a clear indicator that competitors of a kind are available today, thus the label "monopoly" must be quite narrowly considered.

By analogy, consider also that there are security companies that the U.S. government employs in war. The fact of having a public military is a monopoly on a number of militaristic industries and could be said to involve unfair advantages to government offices over private competitors. The value of a government-run military is as best I can tell uncontested, however, even if occasional private companies and services are employed with government funds. The overwhelming value of certain public services and goods is not reasonable to leave to the mercy of market fluctuations. For, if a private company is run on the basis of maximizing profits, military protection could be bought at high enough a price to turn our forces against us. Government monopoly in matters of security and the basic functions of our society must not be at the mercy of vacillating profit incentives.

In an AEI forum called "The U.S. Postal System: Can It Deliver?" four discussants contributed to a published dialogue on postal policy, moderated by John Charles Daly (1978). In it, Congressman Trent Lott contributed an important set of considerations for proposals like mine. He said that

> *The private sector in this country is very innovative, and it is moving into this electronic communication and telecommunications area aggressively. Since there is some movement in that direction, the postal service, and the government in general, should study whether or not to become involved. But just because the business community has come up with some new things, we should not think that the postal service or the federal government must get into this business. (28-29)*

Already in 1978, former Congressman and now former Senator Lott had the foresight to wonder whether the Post Office and the federal government should get involved in electronic communications. In this AEI forum, Lott represented a fairly moderate point of view. At the same time, he holds to the belief that the expansion of government is not inherently a good thing and is something to avoid where not beneficial, a reasonable view. He could not have foreseen, however, just how ubiquitous and fundamental electronic communications would become. He has always been a strong representative of his small, mostly rural state, in which the arguments for Post Offices are especially relevant. The population of his state of Mississippi is quite spread out over an agricultural and poor region. Thus, if mail were to cost more for rural persons who are also generally poorer than the nation's average citizen, regular competitive markets for postal services would render the costs of rural mail inaccessible to many citizens.

The next category of criticism of the Post Office has been on religious and moral grounds. First among these is the holiness of the Sabbath. Post Offices are closed on Sundays. A question would arise, therefore, about the maintenance of Internet utilities on Sunday, given that the Internet is live at all times. I should specify that my argument is primarily about infrastructure for broadband Internet. I am not addressing how the service would be administered, although it is an important consideration to address in a future paper. At the least, we could suggest that if it were desirable to have closed public offices of Internet maintenance on Sundays, maintenance on those days could be outsourced, avoiding the problem. Another

answer could arise by analogy to the military or the police force. Their offices do not close entirely on Sundays. For more on these debates, Wayne E. Fuller's (2003) *Morality and the Mail in Nineteenth-Century America* offers an extensive analysis of the matters of the separation of Church and state in the context of mail services.

A further controversy once concerned "impure literature" and "immoral mail," which were disseminated through the Post Office (Fuller 2003). Evangelical Christians argued that activities that should be considered unacceptable were facilitated with the aid of the mail service. Similar challenges could be raised for Internet infrastructure provided through government initiatives. Several replies to such arguments could be offered. First, the protection of the freedom of speech in America could also be called a facilitation of immoral activity and baseness, yet is protected except in rare instances of grave and immediate danger. Second, it is true that mail deliverers may have been offended by the things they have had to carry to their destinations. This challenge would not be applicable to the matter of public infrastructure for Internet access. Public employees would not be forced to see what they are transmitting. Plus, were illicit activities enabled through Internet connectivity, they would be no more illegal simply due to the Internet component. For instance, bombs sent through the mail would be no worse than those sent via U.P.S. Thus, this challenge is not a great one to overcome.

Conclusion

At a time of economic recession, Americans are looking into the ways that the great number of unemployed persons could be put to work on projects and infrastructure developments that will have a beneficial and lasting impact on the American economy, jobs, education, and the environment. Infrastructure development of Internet access in America would encourage literacy, given that one has to read to use a computer. It would encourage also the purchase of more computers, which would stimulate electronics commerce. It would train citizens in the use of computers, enhancing job skills and enabling access to powerful tools for using public services as well as for finding job listings. Enhanced Internet connectivity would also allow greater access to news services online, which would mean greater distribution of news and possibly a reduction in the printing of physical newspapers, which might mean more environmentally friendly practices. More of the country would have infrastructure necessary for business, too, which would allow and entice more businesses to move to rural areas where taxes are lower and land is cheaper. Arguments against the costs of running Internet access depend upon the methods used to do so. Despite increases in the postage rate, given the increased costs of fuel, the mail is still remarkably cheap. How we go about delivering Internet services analogously would have to be considered carefully, but the expansion of infrastructure is prohibitive to private industry for so many rural communities that, like highways and power grids, government would have to step in to achieve a strong, maximized broadband Internet infrastructure. In this paper, I hope to have shown that there are many resources in American history available for calling for the maximal expansion of immediate, free-flowing political information, enabling a more accountable and responsive government to the needs of American citizens.

Notes

[1] I am grateful to Annie Davis Weber for her suggested revision of my title, which I adopted for the final version of the paper.

[2] Although I do not cite him in the present paper, Benjamin Franklin played a vital role in the creation of the United States Postal Service. The U.S.P.S. created a stamp in honor of his 300th birthday in 2006. Their press release wrote, "Benjamin Franklin was vital to the organization of the American postal system, serving as postmaster of Philadelphia and a Deputy Postmaster for the American colonies before being appointed Postmaster General by the Continental Congress in 1775. He marked postage-free letters with his unique personal signature: 'B. Free Franklin'" (U.S.P.S. 2006).

[3] In this paper, I am deeply indebted to the excellent scholarship of Richard B. Kielbowicz who collected the statements of the founders that I cite in the present paper (Kielbowicz 1983).

[4] The word "tax" was used rhetorically. In fact the one cent cost would be a charge or service fee for those who wanted to use the mail service. This differs from a tax, since one could abstain from using the mail service. A private company charging a corresponding fee would not be said to be taxing its customers, but rather charging them for services rendered.

[5] Emphasis added.

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III. Effects and Outcomes of the Global Warming Alarm: A Forecasting Project Using the Structured Analogies Method.

Kesten C. Green, Monash University and J. Scott Armstrong, University of Pennsylvania

Note: This is a study in process. We seek peer review from others, especially with evidence that would challenge our findings or conclusions.

We summarize evidence showing that the global warming alarm movement has more of the character of a political movement than that of a scientific controversy. We then make forecasts of the effects and outcomes of this movement using structured analysis of analogous situations, a method that has been shown to produce accurate forecasts for conflict situations. This paper summarizes the current status of this "structured analogies project."

We searched the literature and asked diverse experts to identify phenomena that could be characterized as alarms warning of future disasters that were endorsed by scientists, politicians, and the media, and that were accompanied by calls for strong action. The search yielded 71 possible analogies. We examined objective accounts and screened the list; this yielded 26 analogies that met all of the criteria. We coded each of the 26 analogies accounting for the forecasting procedures used, the accuracy of the forecasts, the types of actions called for, and the effects of actions implemented. This paper provides preliminary findings.

The analogous alarms were presented as "scientific," but none were based on scientific forecasting procedures. Every alarming forecast proved to be false; the predicted adverse effects either did not occur or were minor. Costly government policies remained in place long after the predicted disasters failed to materialize. In no case could it be said that the actions taken prevented ill effects.

The findings appear to be insensitive to which analogies are included. The structured analogies approach suggests that the current global warming alarm is simply the latest example of a common social phenomenon: an alarm based on unscientific forecasts of a calamity. The global warming alarm will fade, but not before much additional harm is done by governments and individuals making inferior decisions on the basis of unscientific forecasts.

IV. Science & Technology Innovation as a Complex Adaptive System: Adapting Policy Typologies & Mechanisms.

Liz Johnson, University of North Carolina at Charlotte

The challenges facing science and technology policy design and implementation can be analyzed in various contextual frameworks but need to account for innovation as a complex adaptive system. The central purpose of this paper is to explicate innovation as a complex adaptive system and explore which policy typology and mechanisms can best meet demands for effective science and technology policy in a global economy. Policy typologies have traditionally fallen into incremental and nonincremental categories but need to be re-conceptualized and adapted to the nature of innovation as a complex adaptive system. Past and current trends of

incremental policy design have served to satisfy small slices of innovation system's demands. The intriguing challenges of transformative and convergent technology like nanoscience for example, require an innovative, big-picture approach like nonincrementalism. Indivisibility as a core construct of nonincrementalism, allows for coherent, integrated, and coordinated policy formation to match the demands of national goals of global leadership and a resource-efficient approach to scientific development, advancing society. It is critical to consider the form and function of complex adaptive systems in relation to the form and function of technology and invention as interrelating and motivating elements. Whereby resource scarcity does not always allow for full investment in comprehensive nonincrementalism, incremental policy formation can adapt and incorporate mechanisms and structures from nonincrementalism. A better understanding of innovation as a complex adaptive system and incorporation of policy typology and mechanisms that strengthen and reinforce the natural processes of complexity, will facilitate more effective science and technology policy.

V. Behind the Consensus: An Anatomy of Global Public Opinion on Climate Change.

So Young Kim, Korea Advanced Institute for Science and Technology

Climate change has undoubtedly become a topmost concern of policymakers around the world. As revealed in numerous polls and media reports, public awareness of the climate change problem seems to be never higher than now. This paper explores the contour of current global public opinion on climate change issues, based on the three ways climate change is framed and portrayed to the global public – climate change as a risk issue, as an environmental issue, and as a development issue. Key findings include: (i) public information and knowledge about climate change as a scientifically/technologically complex issue strongly correlates with the aggregate level of education across countries, (ii) climate change as a large-scale, global environmental problem relatively removed from everyday experience tends to receive greater attention by citizens of advanced countries, and (iii) public support for climate change policies which are closely tied with the prospects of economic growth is significantly higher in more developed countries. These findings suggest that despite the apparently emerging consensus on climate change as the defining challenge facing our age, the global public remains largely divided in the level of public understanding of the issue and public support for climate change policies.

VI. North Korea Military Techniques and U.S. Strategy for Balance of Power in Northeast Asia.

Sunny Lee, Institute for Korea-U.S. Political Development

Since North Korea possessed nuclear weapons, the Obama administration has pursued more drastic policy to defeat North Korea's nuclear strategy but its process is not fulfilling the obligation without producing significant outcomes. If North Korea becomes a formal nuclear country with advanced military techniques that continually supports

other potential nuclear countries, the U.S. will lose strategic balance of denuclearization policy in Northeast Asia and it will propel overall shrinkage of the U.S. power.

In this paper, North Korea's overall military techniques with nuclear weapons will be precisely reviewed to establish effective denuclearization policy in U.S. military strategy. North Korea's military techniques can be analyzed and evaluated in a few ways: 1) Overall Military Capacity, 2) WMD, 3) Nuclear Techniques, 4) Missile Systems, 5) Satellites

North Korea already supported Iran's first satellite launch with advanced military techniques and Syria and Myanmar's nuclear development as well. It has also exchanged missile techniques with nuclear techniques of Pakistan. Not only nuclear techniques but also massive destruction missiles and weapons more seriously impact on international security whom North Korea has been exporting or delivering to terror countries and groups. In advance, North Korea would initiate nuclear symptoms in the international society while stimulating nuclear countries to reinforce nuclear weapons.

Therefore, I will focus on U.S. strategy to deal with North Korea's military techniques to find out its strategic tool and apply its methodology on policy-making process. If the U.S. succeeds in denuclearizing North Korea, it will result in controlling China and Japan's military expansion as well as reduction policy of nuclear weapons with Russia on the top position for balance of power in Northeast Asia as the strongest military country in the world.

VII. International Science and Technology Cooperation: Issues and Strategies for U.S. Policy.

Eric J. Novotny, Civilian Research and Development Foundation.

As the new Administration attempts to reinvigorate U.S. science and to address critical problems in a wide variety of applied fields, global concerns re-emerge to present both policy opportunities and challenges. Scientific and technological resources can be leveraged effectively by collaborative research and innovation through partnerships among governments, NGOs, academic institutions and enterprises. International science engagement can also produce many collateral benefits in preventing WMD proliferation, building S&T sector capacity, and supporting nations to transform into knowledge-based economies. These functional benefits can be implemented with a specific set of proven methods: including cooperative grant making, institution-building, and joint issue-oriented centers of S&T excellence. Science policies that recognize these advantages can realize tangible advantages through co-funding arrangements with host countries and in mobilizing a larger pool of scientific assets.

VIII. The Status and Planned Adoption of Electronic Medical Records (EMR): The Role of Information Technology in the Challenges of Reforming Health Care Delivery in America.

Albert Rubenstein, IASTA Inc; Marshall Maglothin, Blue Oak Consulting LLC; Elie Geisler, Illinois Institute of Technology and Giuseppe Turchetti, Scuola Superiore Sant'Anna.

The challenges and the issues confronting healthcare delivery are universal in nature. In the United States there is currently a major effort to reform the healthcare system, by transforming the ways in which it is funded, and introducing changes in the basic elements of the structure and processes of the system itself. A key initiative in this effort is the use of information technology to streamline the clinical and administrative processes of care, and to make the system more efficient and productive. In this vein, the Obama administration has heralded the accelerated implementation of a national system of electronic medical records (EMR).

This paper starts with the analysis of the nature of EMR, its recent history and development and the issues related to its adoption and implementation by healthcare delivery organizations. We compare the adoption of EMR in the U.S. and in several European countries, in which the adoption rates of this technology have been consistently higher than in America. We offer some explanations to the gap in these rates.

Next, this paper analyses the promises of benefits from EMR, and the documented benefits from EMR adoption on healthcare delivery, its cost, quality, and availability. We survey the literature and examine the myths and the realities of the contributions of this technology. We proceed to analyze the barriers and facilitators which impinge on the adoption, implementation and adaptation of EMR systems by hospitals, clinicians, medical practices, and the administrative organizations such as insurers, regulators, and firms in the medical instruments and technologies sector. This analysis focuses on a multi-country assessment of the issues involved with EMR adoption and how several countries—including the U.S--- resolved these issues or are still hampered by these challenges. We emphasize the assessment of what has worked, what didn't and why.

From this analysis we draw key conclusions and derive lessons which may be relevant to the current effort to reform the American health care system and to utilize EMR as a key ingredient in the attempt to make the system more cost-efficient, more accessible, and more affordable. Based on these lessons, we offer some recommendations on how the adoption and utilization of EMR can be a valuable tool in the new administration's major program to employ information technology in the service of the planned reform of healthcare delivery in America.

IX. The Obama Administration's Challenge After the "War on Science": Reforming Staffing Practices and Protecting Scientific Integrity in the Executive Branch.

Justin S. Vaughn, Cleveland State University and José D. Villalobos, University of Texas at El Paso.

In this paper, we examine the difficult leadership position President Barack Obama inherited as he took office with respect to science and technology policy making and

implementation, particularly following the Bush Administration and years of the so-called "war on science." We contend that the Obama Administration's challenge is not only to take substantive policy action, but also to reform certain administrative practices, particularly in light of the previous administration's practice of the politics of strategic vacancies, a managerial technique that rearranges an agency's ideological inclinations not through the usual forms of active politicization (i.e., by filling the appointee ranks with like-minded ideologues), but instead by "starving" the agency of staff and co-opting its agenda that way.