Plan Text

Resolved: The USFG Should reinstate funding for SETI.

SETI Needs Money

SETI has gone into hibernation. It hasn’t been killed, but it’s facing a funding crisis

Holm 11 [Carl, April 27, ABC News, SETI will survive cuts says astronomer, http://www.abc.net.au/science/articles/2011/04/27/3201466.htm]

A top astronomer searching for extra-terrestrial intelligence is optimistic SETI will survive, despite its main telescope being shut down. The University of California Berkeley's Allen Telescope Array (ATA) has been placed in hibernation due to funding cuts, according to an announcement on the SETI Institute's website. The SETI (Search for Extraterrestrial Intelligence) Institute, a private organisation, built the radio telescope array at the UC Berkeley observatory site at Hat Creek. SETI operates the array in partnership with the university, and the project relies on ongoing federal and state government funding. Dr Seth Shostak, SETI senior astronomer, says that funding cuts have hit radio astronomy particularly hard, and that the SETI project is a part of the radio astronomy research being done at the UC Berkeley observatory site. "It's certainly not the end of SETI," says Shostak, "but it is an unfortunate development because while our telescope is on hold, we're not moving forward with it unless we can find some money to operate it."

SETI privatization fails

Privatization of SETI fails

H. Paul **Shuch 2004**, Ph.D. from UC Berkeley, “A Bold Step into the Bank Vault,” December (http://www.setileague.org/editor/boldstep.htm)

The whole argument for privatized SETI hinges on the proposition that individuals can do science better, and cheaper, than governments -- that by dispensing with bureaucracy, we can apply more of our limited resources to science, and less to overhead. That philosophy served the SETI Institute (and, dare I say, The SETI League?) rather well for the past decade. But now, privatized SETI has finally exceeded the budget of our Government-funded forebears. And we started off so well! Where, exactly, did we go wrong?

Perhaps it's that we're trying to do too much. After all, when NASA SETI was cancelled, the SETI Institute chose one specific prong -- the targeted search - to resurrect under the Project Phoenix banner. And they were doing so on a fraction of what NASA was spending. So, logically, The SETI League chose to resurrect the other half of NASA SETI, the all-sky survey, on an even smaller fraction. Privatized SETI seemed to make sense then.

It still does, if we don't let ourselves be drawn too far afield. But now the very SETI scientists whose talents and dedication have long inspired us are branching out. They are, as mentioned in that same article, "probing the chemical pathways critical to life on early Earth and Mars, exploring the molecular traces microbial life might leave on the icy surface of Europa, and seeking novel biosignatures… measuring the 92-cm line of deuterium… measuring dark matter in dwarf galaxies… transitions of heavy molecules in the interstellar gas." And, they are now hard at work building The World's Greatest Radio Telescope. No wonder they need $62 million!

And what aren't they doing? At the moment, they aren't doing any microwave SETI observations. Pity. I thought that's what they were all about. Perhaps I was wrong.

Sacrilege! There's long been an unwritten rule that no SETI organization should ever criticize the efforts of another, lest we cast a public pall over all of us. And I've just broken that rule (but as an individual, remember?) Am I not afraid that, as a result, the public will think less of (and be less likely to support) all SETI efforts, including our own?

Actually, that's already happening, and not because the SETI Institute's programs are not worthy. The problem stems from a persistent public perception that SETI is some single monolithic organization. That's not particularly the fault of the SETI Institute, but it is a reality with which they too have to contend. So, what they choose to do, to raise, and to spend reflects on us all. I hear it whenever I try to raise funds for a SETI League project: "why are you asking me for money, when Paul Allen just gave you millions?" I hear it whenever I encourage individuals to get personally involved in our research: "I'm already letting you use my computer -- you should be paying me!" And I hear it whenever I urge our elected officials to consider renewing public support of SETI: "Why would you want that? You guys are doing so well on your own…"

Well, frankly, we're not. And if you should happen to feel my motives are suspect, my viewpoint less than totally objective, let me wholeheartedly agree. Yes, I'm jealous of the funding apparently available to others but denied to us. Yes, it frustrates me that, while tens of millions of dollars are being poured into the Allen Telescope Array, we can't seem to raise the piddling twenty thousand needed to finish the Very Small Array prototype, which many of you so generously helped us to start four years ago. And yes, sour grapes do indeed go best with a grain of salt.

Uniqueness – SETI isn’t popular and is getting cut

SETI facing budget shortcuts

LA Times 6/18 [Funding cut to the Search for Extraterrestrial Intelligence and the death of curiosity, Christopher Cokinos, 6/18/11, http://articles.latimes.com/2011/jun/18/opinion/la-oe-cokinos-seti-20110618]

News that the Allen Telescope Array is "hibernating" — a curiously biological term for shutting down 42 radio telescopes designed to listen for signs of life from other worlds — raises questions about our true commitment to the search for extraterrestrial intelligence. The National Science Foundation recently slashed the University of California's budgets for the Allen array by 90%. This, along with state cuts, has left UC Berkeley, which operates the Hat Creek, Calif., array in the Cascade Mountains, and the private SETI Institute, which conducts searches, in the lurch. For now, the phone is off the hook — as it was in 1994 when Sen. Richard Bryan (D-Nev.) derided NASA's "Martian chase" and successfully shut down its SETI — "Search for Extraterrestrial Intelligence" — program. It would cost each U.S. taxpayer just 3 cents a year to fund the Allen array, according to SETI Institute Senior Astronomer Seth Shostak. But in this political environment, direct taxpayer support is unlikely, so the SETI Institute is trying to raise $5 million to reboot the array.

Lack of Contribution is Holding SETI back

Penny 11 [Alan, Jan 19, Journal of Astronomy and Geophysics, University of St. Andrews, SETI: peering into the future, http://onlinelibrary.wiley.com/doi/10.1111/j.1468-4004.2011.52121.x/full#]

Different searches have different aims, usually based on some sort of premise of the nature of ETIs. The most obvious choice is of nearby long-lived stars, where ETIs on planets have had time to evolve. Such searches range from Drake's observation of two such stars in 1960, to the million stars planned for ATA. Since stars can differ in ages by billions of years, and ETIs take an unknown time to emerge, a search of a million stars gives a chance of picking up an ETI radiating for a thousand years, which may be a reasonable estimate of the time until an ETI changes into a fundamentally different mode. Then there are the all-sky surveys and surveys of areas of the sky, such as the galactic centre, where no presumption is made of where ETI is – on or off planets, near or far. These necessarily have shorter integrations per pointing, so are sensitive to rarer but brighter sources. The extreme of this is surveys of other galaxies, looking for extremely bright sources, but sources so rare that there is not one in our own Milky Way. There are also specialized searches. A recent proposal is for a search on the ecliptic plane, where an ETI would have been aware for a long time, using the radial velocity and transit planet detection methods, that there is an Earth in orbit around the Sun. Perhaps this would prompt them to signal to us. Searches have also been done looking for artifacts of an ETI civilization. The most famous of these are Dyson spheres, where an ETI surrounds a star with solar panels, probably on many discrete mounts, to tap a significant fraction of the star's energy. The outsides of these panels will be cool, shining in the infrared. Each new infrared catalogue that comes out is scanned for objects of strange non-natural looking colours. There have been searches for strange colours in the asteroid belt objects which might indicate an artificial nature, and for objects in the unstable Earth–Moon L4 and L5 Lagrangian points. There are notoriously many “sightings” of UFOs, which all have either been explained or have not contained enough information to determine their natures. The most interesting ongoing scientific investigation is the Norwegian Hessdalen Valley Project where there have been repeated sightings. The main limit on these searches is funding. There are almost no public funds. Very little sustained work is done outside the US, and within the US the main work is done through private funding and the efforts of determined individuals at Berkeley and Harvard. The SETI Institute, which grew out of the NASA work of the 1970s and 80s, is privately funded and the Berkeley and Harvard projects are done from within radio astronomy and electronics groups with university funding and private support. Outside radio and optical searches there is almost no concerted academic work on the other areas of ETI phase space such as solar system searches or catalogue analysis. Theoretical work depends on the intermittent interest of individuals. There is a lack of resources to fund fresh blood.

Bad news for those of you hoping to find extraterrestrial life: The SETI Institute have been forced to temporarily shut down Allen Telescope Array (ATA) operations due to a lack of funding. The ATA in Northern Califonia, managed by both the SETI and the University of California, Bekeley, is a series of 42 small dishes used for researching radio astronomy and even alien life forms. More recently, it has been used to detect space debris. Money to create and maintain the structure had originally come from donations to the SETI's CEO Paul Allen. It was also funded by the State and the National Science Foundation (NSF), so the university used it for observations and writing academic papers, a few of which were published. Sadly, due to the funding from the State and the NSF being cut considerably, UC Berkeley and SETI made a reluctant decision to put the ATA in hibernation--though it will still be routinely maintained. Of course, this also means layoffs for staff at the Hat Creek site. However, the potentially good news is that if the Air Force Space Command might consider using the ATA for "space surveillance"--snooping and tracking objects in space. Plus, it is not a permanent hiatus. When the California economy picks up and more donations pour thorugh, the telescope ensemble could get back on its feet, or at least help examine NASA's finds on the Kepler Mission. When that is, though, is anyone's guess. It's also pretty good if you are a lifeform preferring to stay elusive. It's a shame a telescope site that has contributed a lot to astrophysic findings has had to face hibernation, but at least it is not permanent. Hopefully no more great telescopes in the country, or in even other parts of the world where the economy might be dwindling, will have to face the same as the ATA.

SETI is poor

Timmer 4/26/11(Ph.D. in Molecular and Cell Biology from the University of California, Berkeley, and a Bachelor of Arts in Biochemistry from Columbia University)http://arstechnica.com/science/news/2011/04/were-sorry-but-seti-cant-take-your-call-right-now.ars

Last week, the SETI Institute announced that its primary observation facility, the Allen Telescope Array, had run out of money for basic operations. The 42-dish radio telescope, based in Northern California, had been constructed with money donated to the SETI Institute, primarily by its namesake, Paul Allen. The dishes will be put into a hibernation of sorts, in which basic maintenance will be performed, but they will be unable to perform observations. SETI data can be gathered on just about any hardware, but for most other telescopes, SETI work is a lower priority than many other basic observations. The Allen Array was an exception. It has been jointly managed by SETI and the University of California-Berkeley, which has used it for standard astronomical observations funded by the State of California and the National Science Foundation; these have resulted in the publication of a number of academic papers. Unfortunately, California is suffering a severe and protracted budget crisis, while the National Science Foundation has cut back on its share of the operating costs. As a result, there is no money to pay for the personnel and power involved with a standard observational schedule. The SETI institute had been focusing on fundraising to build more dishes to expand the array, and hasn't focused on covering operational costs with its fundraising. According to Scientific American, SETI had hoped to use the facility to start scanning the planet candidates identified by NASA's Kepler Observatory. That plan is now on indefinite hold. Now, its best option appears to be to convince the Air Force to use the facility for tracking purposes, while SETI squeezes in observations in the dishes' spare time. In the meantime, the search for ET will have to be done as observatory time becomes available.

SETI doesn’t have any funding now but an increase in funding by ½ percent would transform the program

Penny 1/19/11 [Alan, astronomer, “SETI: Peering into the Future”, http://onlinelibrary.wiley.com/doi/10.1111/j.1468-4004.2011.52121.x/full]

Presently we are limited by the almost total lack of public funding. When I speak to the public about SETI and tell them that almost none of their taxes supporting astronomy goes to SETI they are amazed that such an interesting field is being ignored. If the panels of the astronomy funding agencies were to decide to fund SETI at a level of just one half of one percent of their budgets, SETI would be transformed, and much more powerful and wide-ranging searches could be done. That would be an inspiring thought for us all – that we were taking the search seriously and in this journey into the unknown the human race is truly looking outward. ●

SETI programs continue to get cut – resurrection necessary to find ET

**Grossman** 6/21/**11** [Lisa, science journalist, “Help Bring Back Alien-Hunting SETI Telescopes”, http://www.wired.com/wiredscience/2011/06/setistars/]

The world’s only [telescopes devoted to searching for aliens](http://www.wired.com/wiredscience/2011/04/seti-telescope-shutdown/) went dark two months ago because of a lack of funds. Now you can help bring them back. This morning, SETI launched a website called SETIstars to try to gather funds to resurrect the Allen Telescope Array (ATA), which some astronomers call [our greatest hope](http://www.wired.com/wiredscience/2011/02/geoff-marcy-qa/) for finding ET. The ATA, a joint project between the non-profit SETI Institute and the University of California, Berkeley, has been scanning the skies for signs of life (among other things) since 2007. The original plan was to build 350 dishes in a specific pattern over the volcanic plains of the Hat Creek Radio Observatory in Northern California, which could cover more of the sky more efficiently than a single dedicated dish. To date, only 42 dishes have been built — and right now they’re lying dormant.

Government funding SETI = Good

Federal action is necessary for coordination

**Dominik and Zarnecki 11**[Martin and John C., consequences for science and society and The detection of extra-terrestrial life, Philosophical Transactions of the Royal Society, http://ejscontent.ebsco.com/ContentServer.aspx?target=http%3A%2F%2Frsta%2Eroyalsocietypublishing%2Eorg%2Fcontent%2F369%2F1936%2F499%2Efull%2Epdf%3F%26UCI\_FMT%3DKEV%26UCI%2EUserIP%3D141%2E161%2E8%2E93%26UCI%2EPID%3D00101990]

While scientists are obliged to assess benefits and risks that relate to their research, the political responsibility for decisions arising following the detection of extra-terrestrial life cannot and should not rest with them. Any such decision will require a broad societal dialogue and a proper political mandate. If extraterrestrial life happens to be detected, a coordinated response that takes into account all the related sensitivities should already be in place. In 1989, the International Academy of Astronautics (IAA) approved a SETI post-detection protocol [51], which was developed by one of its committees. Despite the fact that it has subsequently been endorsed by the International Institute of Space Law (IISL), the Committee on Space Research (COSPAR) of the International Council for Science (ICSU), the International Astronomical Union (IAU) and the International Union of Radio Science (URSI), the procedures laid out in that document are not legally enforcible. If it remains a voluntary code of practice, it will probably be ignored in the event to which it should apply. Will a suitable process based on expert advice from proper and responsible scientists arise at all, or will interests of power and opportunism more probably set the scene (cf. [52])? A lack of coordination can be avoided by creating an overarching framework in a truly global effort governed by an international politically legitimated body. The United Nations fora constitute a ready-made mechanism for coordination. Member States of the Committee on the Peaceful Uses of Outer Space (COPUOS) will need to place ‘supra-Earth affairs’ on the agenda in order to take it further to the General Assembly, with the goal of establishing structures similar to those created for dealing with threats arising from potentially impacting near-Earth objects.

It’s sweet to look for Aliens, but not necessarily find them

Kepler has found many potential candidates for ETI. ATA key to search them

**Spiegel 11** [Feb 4, Lee Spiegel, AOL News, Hey ET, Are You Out There? Kepler Helps SETI Tune In, http://www.aolnews.com/2011/02/24/hey-et-are-you-out-there-kepler-helps-seti-tune-in/]

The needle-in-a-haystack search for extraterrestrial signals has narrowed a bit, thanks to NASA's Kepler spacecraft. Scientists announced that, of the 1,235 candidate planets discovered by Kepler, 54 of them were in what's known as the Goldilocks zone, a region close enough to its home sun where a planet may harbor life. When NASA informed the SETI Institute (Search for Extraterrestrial Intelligence) of these possibilities, the California-based institute turned the Allen Telescope Array in the location of those planets and began listening for any signs or signals of intelligent life. Planets so close to their stars with such short orbital periods are called "hot Jupiters." These are considered "candidate" exoplanets -- planets that orbit stars other than our own. SETI senior astronomer Seth Shostak says he and his colleagues were thrilled about the prospect of 54 possible habitable planets. "Well, that is obviously great! Although we've known about planets, the big question is always how many of those planets are, in fact, possibly cousins of Earth, that could support life? "It's nice to know that they're not extraordinarily rare. If you'd asked this question 50 years ago -- and it was asked -- they had to sort of guess at whether planets like Earth were common or otherwise," Shostak told AOL News. All of the data gathered from the Kepler mission suggests that Earth-like planets are not as rare as once thought. Shostak explains that the candidate numbers are pretty huge. "It's the percentage of star systems that might have a world something like Earth. It's not one in a million, it's not one in 100,000, it's not even one in 1,000. Every 100 star systems are going to have a couple of these guys, and maybe more."

SETI is cool

Tough 98[Allen, University of Toronto, Prof. Allen Tough is a noted social scientist, author, educator, and futurist, Positive consequences of SETI before detection, Acta Astronautica Volume 42, Issues 10-12, May-June 1998, Pages 745-748]

Cosmic evolution over billions of years has led to our present period, which is characterized by diverse life on Earth and probably throughout the universe. Eric Chaisson calls this period “the Life Era”[2]and Steven Dick calls this view “the biological universe”[3]. The SETI enterprise makes the likelihood of intelligent life throughout the galaxy feel more tangible and real. Instead of just talking or writing about the possibility, someone is actually doing something about it. As a result, humanity is gradually shifting toward a fresh image of who we are as a species. Increasingly we see ourselves as one of the abundantly diverse intelligent species that have arisen in the universe. That is how we fit into the universe. We feel part of the cosmic family; we feel a bond or kinship with others. We are one of the species that have developed a civilization marked by curiosity, inquiry, knowledge, meaning and purpose. We are not alone in the universe. Although we are unique, we may be one of billions of civilizations in the universe (just as each person and each snowflake is unique, but is also one of billions). As they learn about cosmic evolution and SETI activities, more and more people are developing a deeper sense of themselves as citizens of the universe—as part of intelligent life and evolving culture throughout the cosmos. We begin to move from forlorn isolation to a “feeling of genuine biological and spiritual unity with the universe” and that universe feels “friendlier”[4]. We begin to see ourselves within a galactic frame of reference. To use Michael Michaud’s words, we are about to “leave the era of Earth history, and enter an era of cosmic history”[5]. More recently he noted that “many of us are involved in SETI because we hope that detection, and even the search itself, will introduce a new and positive factor in human affairs. We are involved because SETI defines us as a species with shared interests. We are involved because SETI forces humanity to think big”[6]. According to Frank White, SETI may be, at its deepest levels, an effort to achieve a new kind of connection with the universe—to regain an integration or connectedness that has been shattered by standing apart from the cosmos and examining it as something that is not alive, not intelligent, and separate from ourselves[7]

SETI = International Cooperation

SETI results in international cooperation

Allen E. **Goodman 1990**, Ph.D. in Government from Harvard, an M.P.A. from the John F. Kennedy School of Government and a B.S. from Northwestern University, “Diplomacy and the search for extraterrestrial intelligence (SETI)”

<http://www.sciencedirect.com/science/article/pii/0094576590901417>, science direct

While my survey of international law and SETI projects found that such a code of conduct does not exist, it also revealed growing concern by those engaged in exploring outer space about the impact of their work on national space policy generally, and whether their research would be politicized, if successful. Such concern has been discussed by only a handful of diplomats and national leaders [ ll ]; those who presently set the foreign policy agenda do not regard SETI as a pressing issue. Whatever one may think about the likelihood of extraterrestrial civilizations or how well earthlings might manage contact with them, however, development now of an international code of conduct could assure that the present and projected SETI activities of all countries take place in an atmosphere of international cooperation and public trust.

SETI good for international coop

Vladimir **Kopal 1990**, received an award of the International Astronautical Federation for his dedication to the development of international cooperation in space activities for peaceful purposes, Professor of International Law at the Faculty of Law,

West Bohemian University in Pilsen, Czech Republic, “International law implications of the detection of extraterrestrial intelligent signals”, <http://www.sciencedirect.com/science/article/pii/009457659090138B>, science direct

In o u r opinion, C E T I / S E T I activities may serve "the common interest of all mankind in the progress of the exploration and use of outer space for peaceful purposes" as recognized in a preambular paragraph of the 1967 Outer Space Treaty as one of the basic considerations that led the States Parties to this Treaty toits conclusion. Moreover, international cooperation in the C ETI / SETI field may effectively contribute to one of the main aims of its drafters - the development of mutual understanding and the strengthening of friendly relations between States and peoples. Consideration of this subject could become a tool in helping to draw the attention of the world community to problems of their common concern, and thus strengthen international cooperation and diminish mutual differences.

Unity

SETI creates an overview effect that solves human unity

**Tough 98** [Allen, University of Toronto, Prof. Allen Tough is a noted social scientist, author, educator, and futurist, Positive consequences of SETI before detection, Acta Astronautica Volume 42, Issues 10-12, May-June 1998, Pages 745-748]

Cosmic evolution over billions of years has led to our present period, which is characterized by diverse life on Earth and probably throughout the universe. Eric Chaisson calls this period “the Life Era”[2]and Steven Dick calls this view “the biological universe”[3]. The SETI enterprise makes the likelihood of intelligent life throughout the galaxy feel more tangible and real. Instead of just talking or writing about the possibility, someone is actually doing something about it. As a result, humanity is gradually shifting toward a fresh image of who we are as a species. Increasingly we see ourselves as one of the abundantly diverse intelligent species that have arisen in the universe. That is how we fit into the universe. We feel part of the cosmic family; we feel a bond or kinship with others. We are one of the species that have developed a civilization marked by curiosity, inquiry, knowledge, meaning and purpose. We are not alone in the universe. Although we are unique, we may be one of billions of civilizations in the universe (just as each person and each snowflake is unique, but is also one of billions). As they learn about cosmic evolution and SETI activities, more and more people are developing a deeper sense of themselves as citizens of the universe—as part of intelligent life and evolving culture throughout the cosmos. We begin to move from forlorn isolation to a “feeling of genuine biological and spiritual unity with the universe” and that universe feels “friendlier”[4]. We begin to see ourselves within a galactic frame of reference. To use Michael Michaud’s words, we are about to “leave the era of Earth history, and enter an era of cosmic history”[5]. More recently he noted that “many of us are involved in SETI because we hope that detection, and even the search itself, will introduce a new and positive factor in human affairs. We are involved because SETI defines us as a species with shared interests. We are involved because SETI forces humanity to think big”[6]. According to Frank White, SETI may be, at its deepest levels**,** an effort to achieve a new kind of connection with the universe—to regain an integration or connectedness that has been shattered by standing apart from the cosmosand examining it as something that is not alive, not intelligent, and separate from ourselves[7].

This solves for connectivity, catastrophes, war, overpopulation, and environmental destruction

**Tough 98** [Allen, University of Toronto, Prof. Allen Tough is a noted social scientist, author, educator, and futurist, Positive consequences of SETI before detection, Acta Astronautica Volume 42, Issues 10-12, May-June 1998, Pages 745-748]

Photographs of the whole earth from the early space missions gave us a fresh perspective. A more recent photograph from even further away in our solar system gives us the sense of being a small fragile planet—a pale blue dot surrounded by space[9]. SETI provides a third fresh perspective by encouraging us to think about how extraterrestrials might perceive us. As we view ourselves through the “eyes” of distant extraterrestrials, this fresh perspective leads in turn to a fresh way of looking at our society’s values, goals, priorities and foibles. Three aspects of SETI stimulate this fresh perspective by encouraging us to put ourselves “in the shoes” of remote extraterrestrials. (a) In order to choose search strategies, scientists must first think through the likely characteristics of whoever is out there, and their likely behaviour toward all other civilizations—in particular toward us since they may somehow be aware of our existence or even have some information about us. (b) During the past few years, at astronautics and SETI meetings, some attention has focused on what we should do about sending a reply after we detect a signal. Such thinking inevitably requires attention to how “they” might react to various sorts of replies that we might send. (c) In general, the whole SETI enterprise stimulates a wide variety of people to begin thinking more seriously about who might be out there and how they might view our societ**y**. By thinking about how a remote civilization might view us, we gain a fresh perspective on our own civilization. Various specific implications may occur to us. We may wonder why our society places such emphasis on differences among peop**le** when, compared with any extraterrestrial species, we are all quite similar and should feel deeply connected**.** We may see more sharply the importance of such priorities as ensuring our long-term survival and flourishing, caring about future generations, accumulating significant knowledge, protecting that knowledge from potential catastrophes, developing a set of universal goals and laws that might apply throughout the galaxy, and reducing our worst foibles and errors (warfare, population growth, environmental degradation**).** Surely extraterrestrials would wonder why we have not shifted our attention, resources, and efforts towards these key priorities.

Advantage 2 is Tech Competitiveness

U.S Competitiveness declining – high tech trade deficit

**Hersh Et. Al 11** [ Adam Hersh, Christian E. Weller | February 9, 2011, Measuring Future U.S. Competitiveness U.S. Productivity and Innovation Snapshot, Center for American Progress, http://www.americanprogress.org/issues/2011/02/productivity\_snapshot.html]

Productivity growth—the rate at which we increase production with a given amount of work and resources—is critical to our national economic prosperity and competitiveness, and a factor tied closely to the pace of real investment. Investments in equipment and innovation lead to productivity growth, and productivity growth leads to long-run increases in our standard of living. As the U.S. economy continues to pull out of the Great Recession, a number of trends point to clear signs of trouble for present and future U.S. competitiveness. First, investment continues at a slow pace, barely keeping up with capital depreciation. Second, the effects of slow investment can be seen in lagging productivity growth, which is below average for this point in a business cycle. Third, the U.S. high-tech trade deficit is widening once again. Yet a number of ingredients for faster productivity growth in the future do show promise. This is true for private sector-led research-and-development spending, the number of newly trained Ph.Ds now being minted at our universities, and signs of recovery in the venture capital sector providing critical investment to early-stage innovation, especially for clean energy technologies. The data presented here point to substantial challenges ahead to U.S. economic prosperity. The snapshot of U.S. productivity and competitiveness presented here shows that policymakers must give more attention to strengthening the factors that could lead to future productivity growth and rising living standards

Radio astronomy causes tech spillover, and increases competitiveness

**NRAO 6** [Radio Astronomy Contributing to American Competitiveness October 2006 Compiled by the staff of the National Radio Astronomy Observatory (NRAO). The NRAO is operated by Associated Universities, Inc., under Cooperative Agreement with the National Science Foundation]

Radio astronomy is an exemplary national resource that increases American competitiveness in many ways. It contributes uniquely and significantly to our understanding of the universe, and has been a catalyst for enhanced scientific training and basic research in many fields. Extreme distances, weak signals, and vast amounts of astronomical data require instrumentation and processing that pushes the state of the art to its limits. Radio telescopes, facilities, and instruments are developed on a scale that requires collaborative effort and greater funding than a single organization can provide. These technical innovations lead to private sector investment in research and development that translates fundamental discoveries into the production of useful and marketable technologies, processes, and techniques that effect our lives each day. Technical innovations developed or enhanced for radio astronomy are found in communication antennas, transistor design, cryogenic coolers, medical and scientific imaging, time and frequency standards, atomic clocks and GPS navigation, precision spacecraft navigation, location of cell phone 911 calls, laser rangefinders, and quasi-optical applications. Radio astronomy tracks solar flares that can cause disruption of earth-based communications, damage to orbiting satellites, and destructive surges on power grids. The vast amount of computing capacity required for Searches for Extraterrestrial Intelligence radio signal processing led to a unique grid computing concept that has been expanded to many applications.

Competiveness key to US economy

Council on Competitiveness 8 [“Rebound: Three Essentials to Get the Economy Back on Track,” November 2008, DA 9/18/10, http://www.compete.org/images/uploads/File/PDF%20Files/COC\_Rebound.pdf]

The balance sheets of many companies remain healthy, but business leaders are reluctant to invest in this uncertain, volatile environment. The net result is that tens of billions of dollars in planned capital investment are sitting idle. Enabling companies to expense immediately the full cost of new capital equipment and facilities investments could unlock corporate balance sheets, stimulating jobs and growth. For many companies, the retirement of older equipment and subsequent investment in more efficient machinery, vehicles and equipment will generate tremendous gains in energy efficiency and cost savings as well. The result is an incentive that expands capital investment while driving a higher level of energy productivity. America needs Next Generation Infrastructure to sustain its economic leadership in the global economy. The nation can fund those projects through a unique savings bond program called CompeteBond—tax-exempt, federally-guaranteed bonds available to any American who wants to contribute to our nation’s economic revitalization while raising the personal saving rate and reducing our dependence of foreign borrowing. The resulting capital would be transparently reinvested into projects that, for example, expand broadband access, provide greener public transportation systems and contribute to the development of a national electric transmission superhighway. These investments will result in greater energy and homeland security and lower carbon emissions—and they will produce hundreds of thousands of high-paying American jobs.

U.S economy key to the world economy

**Weiner 10** [Erica, 11/10/10, AP News, Washington Post, Obama: Strong U.S. economy key to global recovery,http://www.washingtontimes.com/news/2010/nov/10/obama-strong-us-economy-key-global-recovery/]

President Obama said a strong, job-creating economy in the United States would be the country’s most important contribution to a global recovery as he pleaded with world leaders to work together despite sharp differences. Arriving in South Korea on Wednesday for the G-20 summit, Mr. Obama is expected to find himself on the defensive because of plans by the Federal Reserve to buy $600 billion in long-term government bonds to try to drive down interest rates, spur lending and boost the U.S. economy. Some other nations complain that the move will give American goods an unfair advantage. In a letter sent Tuesday to leaders of the Group of 20 major economic powers, Mr. Obama defended the steps his administration and Congress have taken to help the economy. “The United States will do its part to restore strong growth, reduce economic imbalances and calm markets,” he wrote. “A strong recovery that creates jobs, income and spending is the most important contribution the United States can make to the global recovery.” Mr. Obama outlined the work he had done to repair the nation’s financial system and enact reforms after the worst recession in decades. He implored the G-20 leaders to seize the opportunity to ensure a strong and durable recovery. The summit gets under way on Thursday. “When all nations do their part — emerging no less than advanced, surplus no less than deficit — we all benefit from higher growth,” the president said in the letter. The divisions between the economic powers was evident when China’s leading credit rating agency lowered its view of the United States, a response to the Federal Reserve’s decision to buy more Treasury bonds. Major exporting countries such as China and Germany are complaining that the Federal Reserve’s action drives down the dollar’s value and gives U.S. goods an edge in world markets.

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