

Congressional Testimony by Wayne Johnson

Vice-President, University Relations Worldwide, Hewlett-Packard Co.

Committee on Science & Technology

Subcommittee on Technology & Innovation

“Bayh-Dole – The Next 25 Years”

July 17, 2007

Introduction

Good afternoon Mr. Chairman and distinguished members of the committee. Thank-you for the opportunity to speak with you today on the subject of *“Bayh-Dole – The Next 25 Years”*

I'm Wayne Johnson, Vice-President of University Relations, Worldwide, from Hewlett-Packard Co. My focus is on bringing universities and industry together to work collaboratively, for mutual benefit and for our innovation system.

I've been working in this area for over 20 years, representing companies such as Raytheon, Microsoft, and now Hewlett-Packard. For the past three years, I've been working on the cross-industry, cross-university efforts at GUIRR (the Government University Industry Research Roundtable), part of the National Academies here in Washington. I've been leading one of the efforts at BASIC (the Bay Area Science and Innovation Consortium in California), and I'm a founding sponsor of the UIDP (the federal University Industry Demonstration Partnership, also here in Washington.) The goal of these efforts has been to remove the barriers that prevent universities and industry from working together, and to understand deeply the partnership models and operating parameters that will work successfully, given the myriad of challenges that both parties face.

Personally, I care deeply about US universities and their ability to work with industry. I believe that ability of these two types of partners to come together around important problems and interesting research areas is a very important part of our future, and our ability to be successful and to lead the world in innovation.

Outline of Key Points and Recommendations

Key Points

Before getting into the details of my testimony this afternoon, there are 3 key points and 2 recommendations that I'd like for you to consider.

Please note the opinions expressed here are from an information technology industry perspective, and are not intended to reflect the issues and concerns of other industries such as Life Sciences, etc. which we understand to have very different needs.

1. We in the information technology (“IT”) industry do not believe in “Home-Run” Patents
 - Today’s products are sophisticated, complex aggregations of software, systems and services (such as the personal computer, PDA or cell phone)
 - Each one contains literally hundreds of patented concepts and implementations
 - Yet no one concept or implementation “makes or breaks” the success of the product
 - **“Home-Run” patents do not drive innovation in the IT industry**
2. One of the key, original goals of the Bayh-Dole legislation was ...*to promote collaboration between industry and universities...*
 - **Unfortunately, it has had just the opposite effect of what was intended**
3. While intellectual property (IP) rights, patents, and a strong IP position have been critical to our success in past,
 - It is innovation, collaboration, and strong relationships and interactions between US universities and industry that will drive our future success
 - **And Bayh-Dole, in its present form, does not address the particular issues of interaction, collaborations, and strong relationships**

Recommendations

1. At this time, we recommend that Bayh-Dole not be changed.
 - Bayh-Dole provides IP protection for industries and business models that depend on a few enabling patents for competitive advantage
 - It also establishes a uniform approach to the ownership and licensing of intellectual property, far superior to the IPA process that it replaced
2. In addition, we recommend a new focus on innovation -- one that makes this country a “hot-bed” of collaboration
 - One that distinguishes the differences between invention and innovation, and that understands the superior value that can be created thru innovation
 - And one that enacts policies to bring innovation to the forefront, both for our industry’s success and for America’s success during the next 25-years
 - When we look into the future from the IT industry perspective, we believe that the focus on patents will wane. Many of the things that drive innovation, from our experience, are in the details, and those details are not about technology licensing.

Innovation & The IT Industry Perspective

The information technology (“IT”) industry has followed a unique evolution throughout the past five decades.

Initially, the efforts of university researchers and companies were largely decoupled, with universities focusing on basic research, and companies working to develop “stand-alone” products. Innovation efforts were typically focused on creating technologies that would enable new categories of products, such as printers, calculators, computers, etc.

As technology advanced and products grew more sophisticated in their capability, the focus of innovation moved to combining these products into systems. An example of such a system is the personal computer which integrates processors, memory, and video into an extremely useful, powerful, and low-cost system.

And as these systems became more advanced, they became linked together into networks, creating a widely available information infrastructure. The emphasis in innovation is now on how to create services that make sophisticated tasks both possible and pervasive, creating a whole new wave of communication and information capabilities enabling the internet, cell phones, iPods, etc.

Innovation in today’s world requires the combined efforts of multiple companies, partnering across multiple industries to bring a competitive offering to the customer. Even the seemingly simple printer shown here involves multiple research disciplines and numerous sciences in its creation, design, and development.



In this new model of product development, “goodness” is equated with the success of many varied players in the resulting ecosystem, all-the-while competing with each other to make contributions to and gain the loyalty of the end-consumer. Their primary mode of operation is innovating, creating more novel and unique value, and driving prices down so that more people can benefit from the products and services being offered. For example, printers that once only printed black & white text and sold for hundreds of dollars, can now print color documents and photographs, make color copies, and scan documents, all-in-one, and sell for \$79.99. People using printing *services* enjoy the experiences of sharing photos with family and friends anywhere in the world, as their printer interfaces with the internet and uploads their favorite photos automatically for sharing with others.

The pace of innovation in the IT industry is accelerated, marked by very rapid time-to-market. Product development cycles are 9-15 months and product life times are in the range of 3-6 months. The phrase that probably best characterizes this industry and its unrelenting pace of new value creation is “innovate or die.”

The Myth of “Home-Run” Patents

“Home-run” patents are those which are key enablers for unique products or spawn whole new industries, and represent massive potential licensing revenue windfalls for a university. Some universities have built their technology transfer offices (TTOs) around the belief that the next “home-run” patent is imminent, eager to capture a significant windfall. Other universities have been driven by the fear of being known as the TTO that let the “big one” get away. This set of beliefs is reinforced by the universities’ TTO focus on licensing revenue as a measure of their success.

These beliefs are driving the universities to behave as if the major, if not only, mechanism for transferring new knowledge is through patenting and licensing. However, there are many mechanisms for disseminating new knowledge out from universities, including student hiring, publications, conferences, informal exchanges, visiting researchers, etc.

For IT companies, the perspective about intellectual property is quite different. Most IT products involve the combined use of hundreds of patented ideas. Many of these patents are incremental advances and concepts for which there is no single patent that defines a key enabling technology. Due to the large number of patents in a typical IT product, companies will not pursue royalty-bearing licenses with universities. Also, the IP in IT products is unlikely to be clearly unique and defensible, since other approaches are generally feasible, making it difficult and expensive to protect. ***For many IT companies, the role of IP is to accelerate product development, rather than to enable it.*** It’s not about the value of a single patent (since it is relatively easy to design around any IP that might present a problem); it’s more about the exchange of ideas and collaborative research that builds out an ecosystem which utilizes the technologies being developed.

As a company in the IT industry, we don’t believe in “home-run” patents, and we don’t believe that they exist (for us). Innovation is driven by the knowledge that is created through collaboration and the flow of ideas, by working with leading research centers and doing good research, and by hiring well-educated students into the research and development activity.

Bayh-Dole: Its Goals and Results

As we have reviewed the original intent of the Bayh-Dole legislation, three of its major goals are identified as –

1. to promote the utilization of inventions arising from federally supported research and development,
2. to encourage maximum participation of small business firms in federally supported research and development efforts,
3. to promote collaboration between commercial concerns and nonprofit organizations, including universities

Promoting Industry-University Collaboration

In this testimony, we will take an in-depth look goal #3 (above), from the perspective of the IT industry.

How well did Bayh-Dole do in terms of its objective to promote collaboration? From the results that have been observed over the past 10 years, we would have to give it a poor-to-failing grade. Unfortunately, much of what has actually happened has been exactly the reverse of what was intended, when the legislation was written.

1. Bayh-Dole has contributed to shifting the focus and attention of joint research towards rights, ownership, and the licensing of intellectual property, and away from collaboration, partnership, and innovation.
2. Bayh-Dole has accelerated the building of a bureaucracy—the technology transfer offices in US universities. Since the inception of Bayh-Dole in 1980, more than 65 US universities have put into place technology transfer offices as a way of dealing with the increasing emphasis on monetizing intellectual property, the belief in “home-runs”, and the shortfalls in university funding.
3. The existence of these technology transfer offices has, in turn, constrained (not amplified) the flow of knowledge and research outward from universities. The TTOs have focused almost exclusively on patenting and licensing revenues, and in many cases operate independently of the industrial liaison offices, the sponsored projects offices, and other mechanisms that universities use to promote engagement and interaction with industry. One notable exception to this phenomenon is where the TTOs have been combined with Industrial Liaison Offices to provide a more comprehensive engagement model between universities and industry (e.g. the UC Berkeley IPIRA model.)
4. The increased focus on rights, licenses, and revenues has strained the already challenging and tenuous relationships that have existed between US companies and universities. This shift in focus towards “intellectual property” has made it more difficult for these two parties to work together. It has fueled mistrust, escalated frustration, and created a misplaced goal of revenue generation, which has moved the universities and industry farther apart than they’ve ever been.
5. The process of negotiating agreements that specify how to work together in joint research areas have turned into disagreements over IP rights and ownership, and **taken up to 2+ years to converge**, if indeed both parties ever come to mutual agreement. Often, both parties give up, disengage from the negotiation process, and resolve never to try and engage with each other again in joint collaborations.
6. The inability to reach agreement, and the frustration, mistrust, and damaged relationships over IP rights have contributed to a “**silent breaking**”, where companies decide that it’s too costly and too much trouble to try and work with universities. Companies then “**walk away**” and find other partners such as the elite universities in Russia, India, and China, who are more flexible in their working arrangements, are easier to work with, and are more agile and speedy in their negotiations.

- If effect, what Bayh-Dole has done, is rather than create a congressionally-mandated reason for universities and industry to work together for mutual benefit and increased societal benefit, is to organize a “shot-gun wedding”, where both parties are trying to do the right thing, but it simply doesn’t work because the focus is misplaced on rights, ownership, and revenue generation.

While the overall practice of collaboration has eroded significantly in the past decades, it’s important to note that not all universities have jumped on the IP bandwagon and focused on IP solely as a source of revenue for their institutions. In our experience there are some universities that can strike an appropriate balance between fostering collaborative relationships with industry, and at the same time managing the rights and patents associated with IP development. Universities such as Purdue, Georgia Tech, UC Berkeley, and Stanford seem to know how to balance all of these needs, and still keep a focus on becoming the partners of choice for US companies.



Innovation, Globalization, and New Interaction Models

While universities and the IT industry have been experiencing increasing relationship difficulties during the past decade, the world situation has been changing dramatically.

When Bayh-Dole was created, it was enacted to address a particular situation and need, at the time. Now, 27 years later, the US IT industry (as well as others) is

challenged with a new set of circumstances -- the forces of globalization, rapid time-to-market, increasing sophistication of products and services, and the need for both rapid technological and market innovation.

With the internet and the ready availability of global supply chains, we are experiencing an unprecedented “flattening” of the world and a “leveling of the playing fields” which before were thought to be the exclusive purview of US industry. The expanded information and communications technology (ICT) infrastructure, together with the increased emphasis on science, technology, engineering, and math (STEM) education globally, has created a situation where literally anyone anywhere can create an innovative product or service, and bring it to market quickly. In this modern, interconnected world, new companies, new industries, and whole new ecosystems are created in a fraction of the time that it used to take for them in past to become established.

The “speeding up” of the world’s rapid pace of development is requiring that we find new models and ways of working together, to match the accelerating pace of global innovation.

In light of this, we observe the following situations:

1. Today, most new information and communications technology (ICT) companies (even small ones of 5-10 employees) are structured to be “global”, from the outset. One does not have to be a big company, to be a global company anymore. For example, every university graduate with entrepreneurial aspirations can start out their career, linking with fellow students from other countries, and is enabled to access design, development, and manufacturing facilities on a global basis.
2. Global companies can work with anyone, anywhere on the planet, and are not constrained to working with university partners in a single country, region, or location. They can choose partners who have knowledge, ideas, insights, and interesting research to offer, and who are not constrained or slowed down by bureaucracies focused on rights, IP ownership, and licensing revenues.
3. As the need for speed and rapid innovation has increased, university TTOs have slowed down and impeded the process of collaboration, and made their institutions increasingly more unattractive and difficult to work with. This has, in turn, encouraged companies to find other university partners to engage with, typically outside the US. It has shifted the sponsorship of research, the vigorous multi-disciplinary interactions, and the flow of ideas to universities in other countries. In terms of innovation and the future of success of US industry, this is a most distressing development.
4. The decreasing interaction and engagement of US universities with companies threatens to reduce the relevance of their research and the quality of their students, and therefore erodes one of the major foundations of the US national innovation ecosystem.

The Technology Transfer Model

While companies go in search of willing partners who are easy to work with on a global basis, universities find that they are becoming increasingly isolated from industry engagement, and are more reliant than ever on government funding and sponsorship.

Perhaps even more worrisome is that the focus on intellectual property of the past two decades has had the unintended effect of institutionalizing an engagement model which is now obsolete in the modern world.

In the old way of operating, research ideas were conceived of, developed, prototyped, and then shown to industry partners for evaluation, further engagement, and hopefully transferred into one or more product development efforts. Usually, universities worked independently during the early years of technology research, and then when they “had something” that was tangible and interesting, they went searching for industrial partners.

This research-then-transfer model (more commonly referred to as “technology transfer”) worked well 20+ years ago when the pace of innovation was a lot slower than it is today, when globalization was relatively unheard of, and when the world was a lot less competitive in the drive to bring valuable products and services to market quickly. Back then, we were afforded the luxury of creating something first, and then searching for an application of what was hoped to be a “valuable technology”.

Collaborative Engagement Models

As the pace of innovation has quickened, particularly in the past decade, the research-then-transfer model has been quietly rendered obsolete. Today, the development and engagement models of choice favor multiple partners from the outset, engaging in the free-flow of ideas, simultaneously envisioning many different applications for their work, and creating different types of products and systems that the technologies might be used in.

These new collaborative interaction models are inherently more parallel, more vigorous and engaging, and involve multiple partners (even competitors) working in tandem on their own ideas of what particular idea or innovation that will provide new value to the marketplace. They can’t wait for a single contribution to be researched, perhaps with a wrong or misguided target application in mind, and then have to redo the research later.

Some of the key points around innovation and interaction models are:

1. Technology transfer is an inherently serial process, takes too long, usually directs research along a single vector of target application, and runs the risk of missing the more useful applications of technology, when the work is at a “transferable stage”
2. The idea of “valuable technology sitting on the shelf” at major research universities is flawed. Much of the value coming out of the innovation process lies in the targeting of early stage ideas to target applications and uses of the technology. This is not where universities can engage from a position of strength.

3. Technology transfer focuses institutions on “things” – rights, patents, licenses, etc. These are late-stage, after-the-fact indicators that something valuable has been going on between interested parties.
4. Collaborative models are more parallel, intensive, open processes that generate a flow of ideas, and calibrate directions and likely results quickly. They involve multiple research perspectives, and often result in a particular idea or concept being effectively utilized in multiple places, across multiple disciplines, and enabling multiple commercialization efforts to be undertaken simultaneously.
5. Collaborative models engage universities and industrial partners at the beginning of the process, there ideas are soft and malleable, and could go in a myriad of directions. With multiple partners present, concepts and ideas can be developed in many different directions, simultaneously from the beginning.
6. Collaborative models are more efficient – they minimize the risk of developing a research work on one particular line of application, and then finding out late in the process that the wrong path was chosen.
7. Collaborative models focus on people, capability development, the flow of ideas. They foster relationship-building, help to build trust, and avoid the traps of negotiating who owns what, and what monies should flow to whom, before the work is ever done.

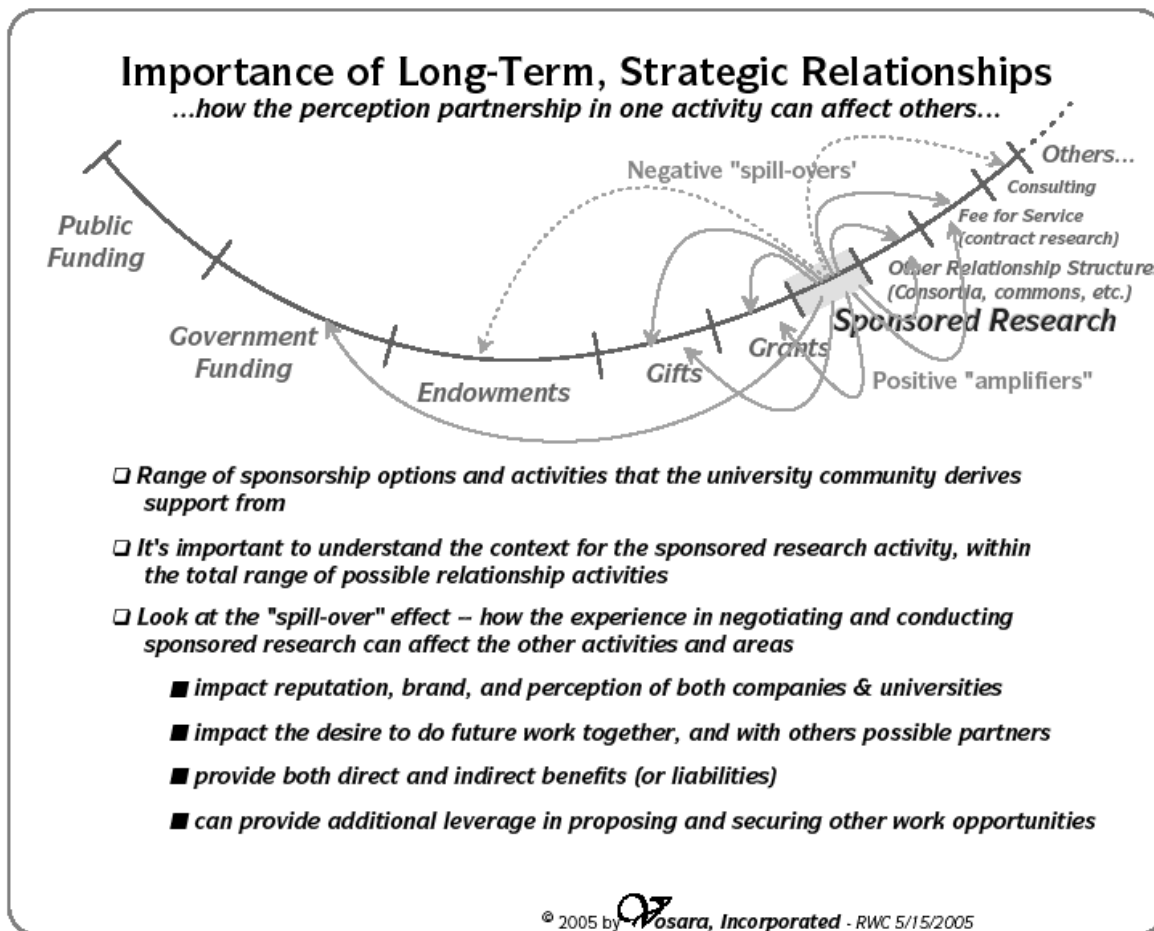
This shift to more interactive and engaging research and development models favors the processes of rapid knowledge creation, the free flow of ideas and concepts, the parallel development of multiple target applications of an idea or technology. In this new model, no single idea or concept becomes the driving force behind compelling new value – it now takes a whole array of new ideas and concepts woven together in such a way as to make the new product or system revolutionary at the time it's interested. As we stated earlier, no single idea can be a “home run”, and the value of a single patent without a whole series of others that complement it, is essentially trivial.

University-Industry Relationships

Another important consequence of becoming overly focused on IP, rights, and ownership, is the damage that is done to long-term industry-university relationships. Universities have a wide range of support needs. As mentioned earlier, the IP-focused negotiations which impede collaboration, and the escalating frustrations, mistrusts, and ill-will that result from not being able to reach agreement, have caused incredible damage to these relationships. Yet the damage goes far beyond the bounds of the sponsored research agreement itself.

In actuality, the funding that sponsored research generates for many universities, is usually only a very small portion of their total income. Yet the negative perceptions, the ill-will, and the memories that are generated from failed negotiations -- the silent breaking, and the walk-away behaviors – have significant spill-over effects into other sources of sponsorship for the university. Long after a single negotiation has failed, the reluctance to participate in other areas of support such as gifts, grants, endowments, research contracts, consulting arrangements, and others lives on. The negative

consequences to the universities on a long-term, aggregate basis dwarf any amount of money that could ever be recouped through IP licenses and royalties.



Summary

For the IT industry to be successful in the coming decades, we must distinguish between inventions (which take us quickly into IP rights, ownership, patents, and licensing discussions) and innovation which is the life-blood of the IT industry. We must recognize that there are different business models operating across different industry sectors, and while a strong IP position may adequately cover the needs of some industries, the need for a focus on innovation, collaboration, and new ecosystem development goes largely unaddressed.

To make the IT industry competitive, we need to begin by creating strong support for industry-university collaboration, and begin to put into place what I call Innovation 3.0 – the next version of a rapid, vigorous, and healthy innovation environment.

We must help make US universities the global partners of choice, in this new, global and “flattened” world, and shift the focus of attention back to people, the flow of ideas, and mutually beneficial interactions. Bayh-Dole, as it is presently written, does not accomplish this, but rather shifts attention away from people and ideas (the raw materials of innovation) to IP, rights, licenses, and the ownership of things.

Bayh-Dole also makes a dangerous leap, in that it confuses invention with innovation, and reinforces a language and a vocabulary solely around rights and ownership. These elements are late-stage artifacts of an obsolete technology transfer model, which runs the risk of putting America out of the loop of a competitive, global marketplace where value is created and true innovation takes place independent of any country, policy, region, or institution.

With Bayh-Dole and other legislation we've tried to address the protection of inventions through a strengthening of IP policy. It's time to do something for the other half of the equation – ***Ignite Innovation, the life-blood of new industries and the foundation of economic development.***

And that time is now!

Thank-you for your attention, and for the opportunity to testify here today.

References

Augustine, Norman R. (2005), *“Rising above the Gathering Storm: Energizing and Employing America for a Brighter Economic Future”*, The National Academies, Washington, D.C.

Florida, Richard, (2007). *“The Flight of the Creative Class – The New Global Competition for Talent”*, Harper Collins Publishers, New York, N.Y.

Friedman, Thomas L., (2005). *“The World is Flat, A Brief History of the Twenty-First Century”*, Farrar, Straus, and Giroux, New York.

Johnson, Wayne C., (2006). *“The Collaboration Imperative”*, Weber & Duderstadt (eds), Universities and Business: Partnering for the Knowledge Society, Economica, London.

Johnson, Wayne C., (2006). *“Challenges in University-Industry Collaborations”*, Weber & Duderstadt (eds), Universities and Business: Partnering for the Knowledge Society, Economica, London.

Johnson, Wayne C., (2007). *“Innovation 3.0: Creating the Next Level Twenty-First Century Innovation Ecosystem Platform”*, Kauffman Thoughtbook 2007, Ewing Marion Kauffman Foundation, Kansas City, MO.

Johnson, Wayne C., (2008). *“Partnering on a Global Scale”*, Weber & Duderstadt (eds), The Globalization of Higher Education, London. (to be published)

Litan, Robert E., Lesa Mitchell, and E.J. Reedy (2007). *“Commercializing University Innovations: Alternative Approaches”*, Working Paper, National Bureau of Economic Research, Cambridge, MA.

Mowery, David C., (2005). *“The Bayh-Dole Act and High-Technology Entrepreneurship in U.S. Universities: Chicken, Egg, or Something Else?”*, Colloquium on Entrepreneurship, Education, and Technology Transfer, University of Arizona, AZ

Thursby, Jerry and Thursby, Marie, (2006). *“Here or There”*, The National Academies Press, Washington, D.C.

Yarris, Lynn, (2007). *“The Future of Innovation: A BASIC Roundtable Symposium and Networking Event”*, Menlo Park, California (to be published)

