MANUFACTURING & TECHNOLOGY NEWS

COVERING INNOVATION, GLOBALIZATION AND INDUSTRIAL COMPETITIVENESS

PUBLISHERS & PRODUCERS, P.O. BOX 36, ANNANDALE, VA 22003
PHONE: 703-750-2664 FAX: 703-750-0064 URL: WWW.MANUFACTURINGNEWS.COM

Wednesday, January 4, 2006 Volume 13, No. 1

HALF THE U.S. PCB INDUSTRY WORKFORCE HAS VANISHED

DOD Is Vulnerable To Loss Of Circuit Board Industry

The rapid decline of the U.S. printed circuit board industry should be raising red flags and a plan of action at the Pentagon, according to a new report from the National Research Council. With U.S. production projected to fall below 10 percent of world output (down from 42 percent in the mid 1980s), the military could soon be facing a crisis in finding U.S. companies capable of producing highly sophisticated circuit boards and assemblies for weapons systems needed to field a "netcentric" military force, says the report entitled "Manufacturing Trends in Electronics Interconnect Technology."

The diminution of the printed circuit board (PCB) industry raises fundamental questions as to how the Defense Department is going to handle technology development and assurance of supply in a global economy. "The dynamics are huge," says one member of the NRC committee investigating the industry. "DOD is caught looking at problems that are bigger than defense."

Among the larger questions raised by the decline of the PCB industry: Can there be innovation in the defense electronics sector without a robust manufacturing base, as electrical engineers and designers move offshore? Should the Defense Department fund R&D if there is no U.S. production base for the application of the resulting innovation?

Says David Berteau, chair of the NRC Committee that produced the report: "The message is that you need to wrestle with the big picture, but we should not wait

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Congress Tells Bush To Develop Plan For Aeronautics

BY KEN JACOBSON

Congress is putting President Bush in charge of developing a far-reaching aeronautics research policy aimed at setting national goals and describing "the role and responsibilities of each Federal agency" involved in carrying it out, according to a provision included in NASA authorization legislation passed last month.

Meant to guide the overall aeronautics research and development programs of the United States through 2020, the policy will also establish "priority areas of research for aeronautics" at NASA through fiscal year 2011. Its terms, as laid out in the NASA Authorization Act of 2005 (S. 1281), are nearly identical to those signed into law in legislation covering NASA's 2006 appropriations (H.R. 2862).

Congress wants the new policy to describe the "facilities and personnel needed to carry out" the agency's aeronautics research program through 2011, and the basis and process for selecting its aeronautics research priorities in later years.

Both also require the policy to set, in the words of H.R. 2862, "the budget assumptions on which the national aeronautics policy is based." Major issues to be taken into account in developing the policy, largely common to both the appropriations and authorization bills but quoted here from the latter, are:

• "The extent to which NASA should focus on long-term, high-risk research or more incremental research, and the expected impact of that decision on the United States economy and the ability to achieve

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Health Care Is Not What Ails Big Three Auto Makers

BY BOB EMILIANI

Recent concerns over health care cost increases at GM, Ford and Chrysler are just another item in the very long list of "corporate excuses" for poor competitiveness — and also for providing cover for cutting health benefits, pensions and moving work offshore to low-wage countries.

Between 1997 and 2003, health care cost increases have averaged $250 million per year at GM; $160 million per year at Ford and $110 million per year at Chrysler. The approximate amount of cost that needs to come out of GM, Ford and Chrysler annually (based on 2003 revenues) to offset these increases, is 0.13 percent for GM, 0.1 percent for Ford, and 0.12 percent for Chrysler (0.064 percent for DaimlerChrysler as a whole).

A large part of the solution lies in systematic process improvement, as practiced by Toyota. Senior managers skilled at leading and directly participating in enterprise-wide process improvement activities — not those solely in manufacturing — typically achieve 1.5 to 3 percent cost reductions per year as a percent of total revenue. But that requires widespread employee involvement — without threat of layoffs for improving productivity — something that the Big 3 still do not understand.

What really threatens GM's (and Ford and Chrysler's) ability to compete is:

- Overcapacity and overproduction;
- Overhiring (due to low productivity, both shop and office);
- Underdesign or overdesign of products and services;
- Overcompensation of senior managers (direct pay, stock options and perks);
- Overpaying for acquisitions and making un-wise acquisitions;
- Overspending on IT systems and related labor;
- Using business tools that increase total costs, such as online reverse auctions (see http://www.theclbm.com/research.html);
- Overpaying for consulting services from top-tier suppliers;
- Recalls, warranty expenses, litigation and government fines; and
- Non-essential investments in such things as art and real estate.

These practices result in several hundred millions of dollars wasted annually (for each company). It would also help greatly if leaders led in ways that did not cause so much stress and stress-related illness among employees.

It is true that health care services must be greatly improved and costs lowered, but that is yet another area where the principles and practices of the Toyota Management System can be put to use.

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Aeronautics Plan...(Continued from page one)

environmental and other public goals related to aeronautics.

- "The extent to which NASA should address military and commercial needs.
- "How NASA will coordinate its aeronautics program with other Federal agencies.
- "The extent to which NASA will conduct research in-house, fund university research, collaborate on industry research, and the expected impact of that mix of funding on the supply of United States workers for the aeronautics industry."

While S. 1281 gives the president a year to submit the policy to Congress and provides NASA two months more than that to submit a report on how the agency will carry it out, its language makes clear that the policy's influence will be felt as early as next month, when the administration presents its 2007 budget to Congress.

The bill requires that a report accompany the budget request for NASA aeronautics that describes "the extent to which the program directions proposed for fiscal year 2007 are likely to be consistent with the national policy being prepared" in accordance with its provisions.

This report is also to describe both "the rationale for the budget levels and activities in the proposed fiscal year 2007 NASA aeronautics budget" and "the extent to which the proposed programs for fiscal year 2007 are consistent with past reports and current studies of the National Academy of Sciences, and other relevant reports and studies."

That such explicit instructions are provided may reflect an impatience on the part of Congress similar to that suggested in remarks penned by House-Senate conferees on the appropriations bill as they explained their own move to require a national aeronautics policy.

They attributed to the absence of "clear policy direction concerning the [U.S.] government's role in the civil aviation industry" what they called a "lack of support and clear direction for NASA's Aeronautics Research program," at the same time declaring themselves "extremely concerned" at its proposed "downsizing and restructuring."

"While the United States is reducing its federal investment in aeronautics research, our competitors are increasing their aeronautics research development budgets and making competitiveness their number one priority," their report states.

Conferees on the authorization bill said "a healthy and vibrant aeronautics research capability and aerospace industry are vital to the nation's economic security" and asserted that the bill's provisions would "ensure the vitality of aeronautics research within the framework of a clear set of national policy objectives."

Congress Snubs Bush; Bumps Up Research Funding For Aeronautics At NASA

Aiming to prevent spending on aeronautics research at NASA from going into the steep dive charted for it by the Bush administration, Congress has set funding levels for aeronautics activities in its latest NASA authorization bill that exceed by at least $250 million per year those projected for 2007 and 2008 in the president's 2006 budget request.

BY KEN JACOBSON

The NASA Authorization Act of 2005 (S. 1281), sent to the White House for signature on December 23, also explicitly "reaffirms" what it calls "the national commitment to aeronautics research," emphasizing its importance both to the nation's security and to its economic competitiveness.

In passing the NASA authorization, lawmakers confirmed the support for NASA aeronautics provided by the 2006 appropriations bill (H.R. 2862), which allocates $912.3 million for aeronautics. This amount improves on the 2005 figure by only $6.1 million but is $60 million above President Bush's 2006 request (*MTN*, Nov. 14, p. 3).

The sums authorized by Congress — $962 million for 2007 and $990 million for 2008 — would set a trajectory opposite to that plotted by the administration when it projected annual levels for the period 2007-2010 of between $718 million and $731 million. In responding to an earlier version of the bill, the Office of Management and Budget (OMB) said the 2007 aeronautics authorization was "contrary to the President's Budget," but did not threaten a veto.

Lest there be ambiguity as to the meaning of its numbers' upward direction, S. 1281 created a separate section, "Governmental Interest in Aeronautics Research and Development," to underline that "aeronautics research and development remains a core mission of NASA....The government of the United States shall promote aeronautics research and development that will expand the capacity, ensure the safety and increase the efficiency of the Nation's air transportation system, promote the security of the Nation, protect the environment and retain the leadership of the United States in global aviation."

To this end, the NASA Authorization Act also adopts, nearly verbatim, language from the 2006 appropriations bill that calls upon the president to develop a national policy aimed at guiding U.S. aeronautics R&D programs through 2020.

NASA's aeronautics research program "has been recast several times...in recent years," noted House and Senate conferees in an explanation accompanying S. 1281. "In concert with the national aeronautics policy, [the authorization] should help NASA engage in an aeronautics program that is not radically reformed each fiscal year."

Indeed, a reorganization undertaken by NASA's Aeronautics Research Mission Directorate (ARMD) in the face of the funding profile sketched out in the administration's 2006 budget and announced along with it has been scrapped under Michael Griffin, who assumed the post of NASA administrator in April. Aeronautics programs are now being reshaped again under Associate Administrator Lisa Porter, whom Griffin brought in to head ARMD.

The abandoned plan would have concentrated the resources of Vehicle Systems, the largest of ARMD's three programs, on four technology-demonstration programs in an apparent attempt to impress legislators, OMB, or both with spectacular breakthroughs at regular intervals. Now, ARMD is adopting a "new focus on fundamental aeronautical sciences," Griffin told the House Science Committee on November 3.

This transition and an injunction in the Authorization Act calling upon the NASA administrator to "establish a program of long-term fundamental research in aeronautical sciences and technologies that is not tied to specific development projects" appear, thus, to be in synch.

The Fundamental Aeronautics Program, Vehicle Systems' new name, "will create projects that provide continual, long-term investment in the fundamentals and that build upon that investment to develop system-level, multidisciplinary capabilities that will enable both the civilian and military communities to build platforms that meet their specific needs," the NASA administrator testified.

A reorganization undertaken by NASA's Aeronautics Research Mission Directorate sketched out in the Bush administration's 2006 budget request has been scrapped...

Core competencies in rotorcraft and hypersonics — two fields that were to be axed under the previous restructuring — would be preserved under the Fundamental Aeronautics Program, he said. Provisions of S. 1281 authorize research and technology programs in both areas, as well as in commercial aircraft noise, energy consumption, and emissions; supersonic transport, "revolutionary aeronautical concepts" for subsonic fixed-wing vehicles and propulsion; fuel-cell powered aircraft; and Mars aircraft.

Congress and NASA seem to be on the same page when it comes to a second ARMD program — Airspace Systems — whose domain is the improvement and modernization of the nation's air-traffic management system. S. 1281 requires that the program be aligned with the objectives of the interagency Joint

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Circuit Board Industry...(Continued from page one)

until we have all the answers before we begin addressing the most critical industries."

The NRC committee spent a year assessing the state of the printed circuit board industry and its impact on DOD. It recommends that DOD affirm its "critical" dependence on the industry; that it start an assessment of its economic health by collecting data; and that it increase support for the few national PCB research facilities that do exist. "The threat potential posed to overall defense capabilities by lack of access to high-quality trusted PCB component technology will require a more specialized assessment for understanding how best to use DOD resources to maintain and enhance the nation's security," says the report.

The growing divergence between commercial and military applications for interconnects has presented a complex challenge for DOD, "but it's not an impossible task to deal with this," says committee chairman Berteau. The Pentagon needs to know whether it is vulnerable to shortages and to such things as "Trojan horses" inserted into electronic circuit boards. "You have to answer those questions and you can't do it with piecemeal studies," Berteau says. "You can't do it with outside groups. DOD has to have the analytical capability and the in-house expertise to be able to answer those questions and to make judgments on its [technological and industrial] priorities so that the allocation of the next marginal dollar goes to the highest and best use."

DOD cannot wait until it knows all the answers to the questions about whether it can operate without a domestic industry. It needs to determine which electronics industries it needs to sustain and then put in place policies to assure there is an industrial base there to supply it. "My view is that it's a lot easier to steer a moving car, so get in it, start driving and make adjustments as you go," Berteau told *Manufacturing & Technology News*.

"You need to have the big picture in mind and wrestle with it, but to test [policy avenues] with critical, vulnerable and threatened areas that have a fairly discreet universe like printed circuit boards."

The Department of Defense "has no chance in fighting the economic dynamics" that are pushing the industry to China, says one member of the NRC committee. But the Pentagon has not invested in the sub-tiers of the electronics industry for 10 years, and now must pony up. "If you want a specialty industry, you have to subsidize and support it and accept that fact, and focus on the problems caused" by relying on commercial off-the-shelf components that are neither made in America nor have any applications in military equipment.

Berteau says DOD can't expect much innovation from the small board processors remaining in the United States — companies that generate between $10 and $20 million a year in revenue. "You may occasionally get a brainstorm because there are a lot of smart people who spend their recreational hours trying to think about new ideas," he says.

"But that's not a system; that's serendipity. If you're going to have a system that's based upon small shops that meet only DOD or a few other industry's needs such as medical equipment and industrial machinery, then where is that innovation going to come from?" In many cases, these industries only require 150 boards, many orders of magnitude less than the tens of thousands and millions of commoditized boards used in the consumer electronics and telecommunications industries.

The printed circuit board industry trade association is pleased

(Continued on next page)

QUOTABLE:

"The top three U.S. producers of printed circuit boards all have significant manufacturing bases outside the United States, even though their annual sales are attributed to the United States. Of the top 25 PCB manufacturers worldwide in 2003, only four were U.S. companies — Viasystems Group (11 plants), Sanmina-SCI (13 plants), Multek (14 plants) and Tyco (16 plants). Of these four companies, only one (Tyco) did not have a significant component of the production in offshore manufacturing. Of the top 10 PCB manufacturers headquartered in the United States, half place the majority of their production in Asia.

"In 2000, nearly 80,000 people were employed in the North American PCB industry....At the beginning of 2004, the total dropped to just over 41,000...No major technolog[ical] change was introduced during this period to increase productivity, so the decrease can be almost wholly attributed to production moved from U.S. to overseas locations."

— "Manufacturing Trends in Electronics Interconnection Technology," National Research Council

Annual Sales for Top Ten Companies in Printed Circuit Industry, 2000 and 2003

Top 10 Producers, 2000		Million U.S. $	Top 10 Producers, 2003		Million U.S. $
1 Sanmina-SCI	United States	1,500	1 Nippon Mektron	Japan	1,117
2 Visasystems	United States	1,250	2 CMK	Japan	1,049
3 CMK	Japan	1,112	3 Ibiden	Japan	1,027
4 Ibiden	Japan	1,083	4 Hitachi Group	Japan	685
5 Hitachi Group	Japan	973	5 Shinko Denki	Japan	636
6 Nippon Mektron	Japan	905	6 Unimicron	Taiwan	609
7 Compeq	Taiwan	802	7 Samsung E-M	Korea	545
8 Tyco	United States	780	8 Compeq	Taiwan	462
9 Fujitsu	Japan	624	9 Nanya PCB	Taiwan	453
10 Multek	United States	600	10 Daeduck Group	Korea	422
Total		9,629			7,005

(Source: "Mfg. Trends in Electronics Interconnection Technology," National Research Council)

Wal-Mart Lawyers Outsmart Labor Department Regulators

Lawyers for Wal-Mart were able to write their own settlement agreement with the federal government's Employment Standards Administration (ESA) after having been cited for allegations that the company violated child labor laws written in 1938, according to the Inspector General at the Labor Department. Wal-Mart lawyers dictated the terms of the settlement agreement and included provisions that require the federal government to notify the company 15 days in advance of any inspection or audit it plans to conduct of Wal-Mart facilities for "any potential violation" of child labor laws or any wage or labor dispute.

Although the agreement did not violate any laws, Wal-Mart was able to write terms that allow it to avoid paying civil money penalties in the future. The agreement also allows Wal-Mart to jointly write press releases with the Department of Labor over any similar types of labor investigations. "Breakdowns in the settlement agreement process resulted in the Wage and Hour Division (WHD) entering into an agreement that gave significant concessions to Wal-Mart," says the IG audit.

The Wal-Mart agreement contained "significant provisions that were principally authored by Wal-Mart attorneys and never challenged by the ESA's (WHD)," says the Inspector General. "The lack of a formal process for management review and approval [of the settlement agreement] resulted in inadequate review of key provisions of the Wal-Mart agreement."

The agreement signed by the two parties is also "significantly different" from all other similar types of agreements entered into by the Wage and Hour Division. "Specifically, the Wal-Mart agreement had the most far-reaching restrictions on WHD's authority to conduct investigations and assess civil money penalties," says the IG. "In our view, the Wal-Mart agreement may adversely impact WHD's authority to conduct future investigations and issue citations or penalty assessments and potentially restricts information from the public."

The 88-page audit "Agreement With Wal-Mart Indicates Need for Stronger Guidance and Procedures Regarding Settlement Agreements" (Report No. 04-06-011004-420) is available at http://www.oig.dol.gov/public/reports/oa/2006/04-06-001-04-420.pdf.

Congress Funds Aeronautics...(From page three)

Planning and Development Office's Next Generation Air Transportation System (NGATS), a step that Griffin told the Science Committee in November was already in progress.

The act also calls for the third program to focus on aircraft safety and will focus on areas related to integrated vehicle health management, resilient aircraft control, intelligent flight deck technologies and aging aircraft.

But even if NASA and congressional authorizers are heading in a similar direction, the real test is apt to take place in the appropriations arena. As observed at the November 3 hearing by Rep. Mark Udall (D-Colo.), the ranking minority member of the House Science Subcommittee on Space and Aeronautics and a strong backer of aeronautics at NASA, in light of "the administration's current budgetary plan" ARMD may be opting, in its latest reorganization, for too much of what he himself sees as a good thing.

"While I am encouraged that NASA recognizes the importance of rebuilding its fundamental research and technology program in aeronautics," he said, "the budgetary constraints imposed on the aeronautics program would appear to make that rebuilding come at the cost of significantly shrinking NASA R&D that is more directly relevant to the needs of the aviation industry and society as a whole. That makes little sense to me, and I hope that NASA will embrace a more balanced portfolio."

PCB Industry...(Continued from previous page)

with the NRC report, having been in the forefront of raising concerns about military vulnerability. "The recommendations go to what we've been arguing: that there is a problem out there and we need to start investing in technology and training to sustain it in the future particularly in defense needs," says John Kania, director of government relations at IPC, the Association Connecting Electronics Industries. "I'm not surprised by the recommendation that DOD take a closer look because there is not a lot of data going down into the third and fourth tier suppliers. We need to make that investment because it's all just disappearing."

IPC believes DOD needs to follow up on the National Research Council recommendation for investment in interconnect R&D efforts at the Crane Division of the Naval Surface Warfare Center in Indiana and at the Warner Robins Air Logistics Center in Georgia. The PCB research facility at Crane this year (2006) received $2.1 million. IPC lobbied for $5 million. Without an adequate investment in technology "how does DOD intend to get is printed circuit boards and electronic assemblies?" Kania asks. "Where are they going to come from? How high-tech will they be and will they be reliable and secure? Based on the [NRC] report, we're going to get industry involved for the DOD '07 budget cycle."

For now, it is unclear as to whether many people in Congress, the Pentagon or the Bush administration really care or believe there is a problem worthy of attention, say observers.

—RICHARD McCORMACK

NEW (AND OLD) PLANTS

Nokia will double its production capacity for mobile phones in China. The company's plant in Dongguan will expand employment from 1,100 to 1,900 in order to keep up with growing demand in Asia. Nokia employs about 6,000 people in China and sold about 23 million handsets in China during the first three months of 2005.

Gould Electronics, a manufacturer of copper foil, has announced plans to close its Chandler, Ariz., manufacturing plant and U.S. headquarters by April 2006. The company, a division of Nippon Mining Holdings, says "depressed U.S. market conditions," competitive world pricing and the high cost of copper are forcing its hand. "We regret the impact it will have on our employees, their families and the community," said Gould Electronics president David Burgess. The company will lay off 220 employees. "Our maximum effort will be directed to building inventory to assist our customers in a smooth transition to other suppliers."

BMW will build a new manufacturing plant in Chennai, India. The company has signed an agreement with the Tamil Nadu government to build an assembly plant alongside plants operated by Ford and Hyundai.

Solectron Corp. has opened a new medical manufacturing plant in the "Medical Center of Excellence" technology park in Chai Chee, Singapore. Solectron will produce liquid chromatographs and fluidics subassemblies. The plant "allows Solectron to provide medical companies unprecedented outsourcing capabilities," said Marc Onetto, vice president of operation for Solectron. "Working cooperatively with Singapore's Economic Development Board, we are helping to attract medical instrumentation companies to the region."

RTP Co., a maker of specialty thermoplastic materials based in Winona, Minn., has opened its first manufacturing plant in China. The 16,000 square-meter facility located in the Suzhou Industrial Park "is a strategic move towards globalization necessitated by our growing customer base in Asia and the expectations of our multinational customers who require the same materials anywhere on the globe," said company CEO Hugh Miller. "Suzhou is located in an ideal strategic location with an abundance of top-notch talent. And the pro-business attitude of the China-Singapore Suzhou Industrial Park Development Company is also important." The Suzhou facility is RTP's second manufacturing plant in Asia. The first Asian facility opened in Singapore in 2002.

Air Products & Chemicals has finished construction of a new air separation plant in Tangshan, Hebei Province, China. The facility will supply gaseous oxygen via pipeline to Guo Feng Steel and Fufeng Steel. The plant will also produce 300 tons per day of liquid products to support other customers in the Northern China to meet the growing demand in the region.

Whirlpool says it will invest about $250 million in its U.S. and Mexican manufacturing facilities in 2006 and will shift some production from Arkansas to Mexico. In the last 12 months, Whirlpool has equipped its Clyde, Ohio, and Marion, Ohio, manufacturing facilities for the production of a new, top-loading clothes washer and dryer model. It has begun production of a new front-loading clothes washer in its Monterrey, Mexico, facility; and completed construction of a new refrigerator plant in Ramos Arizpe, Mexico, to produce side-by-side refrigerator/freezer models, beginning in 2006 and employing 1,000 workers.

Once the Ramos Arizpe facility is operational in October 2006, approximately 730 employees at Whirlpool's Fort Smith, Ark., plant will be laid off. There are 4,600 workers at the Fort Smith facility. Many of the workers being discharged "would be recalled within 18 months," says the company.

Sipex Corp., a Milpitas, Calif.-based maker of semiconductor wafers, has decided to ship all of its production to China. The company will close its U.S. BiPolar and BiCMOS wafer manufacturing facility and send the production equipment to Hangzhou Silan Integrated Circuit Co.'s facility in the Xiasha technology park outside of Shanghai. "This relationship is the start of a new reality, as China becomes a significant manufacturer and procurer of analog products," says Ralph Schmitt, CEO of Sipex. "We need a new progressive [business] model to be successful in the fastest growing market in the world. The sacrifices made by the people we expect to lay off due to this strategic manufacturing transition are greatly appreciated by me and by our shareholders. We will need their continued support and cooperation in order to properly meet our customers' needs during the transition period."

UK-based **Colortrac**, a maker of electronic scanners, will start production of scanners and components in China. The company has created a wholly-owned Chinese subsidiary based in the Suzhou Industrial Park 80 kilometers outside of Shanghai to produce sub-assemblies for wide-format scanners. "The formation of the new company will enable Colortrac to control fully all its manufacturing activities, reduce production costs and ensure product quality for our customers," says the company.

AMD has announced plans to build a new $230-million plant in Malaysia. It is also considering construction of another fab in China, according to AMD President and CEO Hector Ruiz at a press conference in Sunnyvale, Calif., the first week of December.

Singapore-based **SciGen**, a maker of insulin, has announced plans to build a $30-million manufacturing facility in Hefei, China, in response to growing demand for Hepatitis B (HBV) vaccine and insulin. The company says the plant will enable it to keep up with the 10 percent growth rate in the use of insulin per year, in a total worldwide market valued at more than $5 billion. Hepatitis B has reached "epidemic proportions," with

(Continued on next page)

Rest Of The World Is Catching Up With U.S. Manufacturing Wages

Most countries are catching up to the United States in hourly compensation, according to the Bureau of Labor Statistics. "Compensation costs relative to the United States rose in nearly all the economies covered in 2004, with Europe showing a relatively large increase," according to the BLS report "International Comparisons of Hourly Compensation Costs for Production Workers in Manufacturing 2004."

Hourly compensation costs for production workers in the U.S. manufacturing sector increased 4 percent in 2004 to $23.17. A Mexican production worker's average hourly compensation in 2004 was one-tenth that amount: $2.50, up one penny from the previous year's amount of $2.49, and down from $2.60 in 2002. The BLS does not say what the hourly compensation cost is for manufacturing workers in China and India.

Twelve European countries had higher hourly compensation costs than the United States, in a few cases more than 40 percent higher.

"Compensation costs for production workers in manufacturing, measured in U.S. dollars, continued to rise strongly in 2004 in most of the foreign economies, with most countries showing double-digit increases. Only three economies — Hong Kong SAR, Mexico and Singapore — recorded slower rates of growth than the United States," says the report. "As a result, the rate of compensation increase in a trade-weighted average of the foreign economies was 8.9 percent in 2004, well above the 5.7 percent historical average." The report is located at ftp://ftp.bls.gov/pub/news.release/ichcc.txt.

Hourly Compensation Costs In U.S. Dollars For Production Workers In 32 Countries

Country or area	1975	1980	1985	1990	1995	2000	2001	2002	2003	2004
Americas										
United States	6.16	9.63	12.71	14.84	17.21	19.70	20.58	21.40	22.27	23.17
Brazil	-	-	-	-	-	3.51	2.95	2.56	2.74	3.03
Canada	6.11	8.87	11.20	16.33	16.50	16.48	16.23	16.66	19.37	21.42
Mexico	1.45	2.19	1.58	1.56	1.47	2.20	2.54	2.60	2.49	2.50
Asia and Oceania										
Australia	5.60	8.44	8.18	13.09	15.36	14.39	13.30	15.41	19.78	23.09
Hong Kong SAR (1)	0.75	1.50	1.73	3.22	4.80	5.45	5.74	5.66	5.54	5.51
Israel	2.03	3.41	3.66	7.71	9.50	11.49	12.25	11.03	11.66	12.18
Japan	2.97	5.46	6.27	12.54	23.55	22.02	19.43	18.65	20.32	21.90
Korea	0.32	0.95	1.23	3.70	7.28	8.24	7.72	8.77	10.03	11.52
New Zealand	3.10	5.14	4.30	8.01	9.78	7.91	7.53	8.60	11.04	12.89
Singapore	0.83	1.53	2.53	3.75	7.58	7.19	6.97	6.71	7.18	7.45
Sri Lanka	0.28	0.22	0.28	0.35	0.48	0.48	0.45	0.49	0.51	-
Taiwan	0.37	0.99	1.49	3.85	5.87	6.19	6.05	5.64	5.69	5.97
Europe										
Austria	4.50	8.87	7.57	17.91	25.26	19.17	19.08	20.69	25.32	28.29
Belgium	5.77	11.74	8.29	17.84	25.64	20.09	19.80	21.74	26.52	29.98
Czech Republic	-	-	-	-	2.53	2.83	3.13	3.83	4.72	5.43
Denmark	6.24	10.77	8.10	18.35	25.28	21.87	22.02	24.25	30.15	33.75
Finland	4.63	8.30	8.20	21.15	24.31	19.44	19.85	21.78	27.10	30.67
France	4.50	8.90	7.48	15.36	19.26	15.46	15.65	17.12	21.14	23.89
Germany, Former West	6.26	12.16	9.46	21.71	31.41	23.71	23.51	25.31	30.99	34.05
Germany	-	-	-	-	30.09	22.67	22.48	24.20	29.63	32.53
Greece	1.69	3.73	3.67	6.82	9.07	-	-	-	-	-
Hungary	-	-	-	-	2.69	2.79	3.16	3.92	4.80	5.72
Ireland	3.06	6.02	6.00	11.77	13.75	12.72	13.60	15.26	19.09	21.94
Italy	4.64	8.09	7.56	17.28	15.69	13.84	13.61	14.75	18.11	20.48
Luxembourg	6.22	11.51	7.48	16.00	23.36	17.51	17.21	18.71	23.12	26.57
Netherlands	6.58	12.05	8.73	17.98	24.03	19.33	19.85	22.12	27.47	30.76
Norway	6.90	11.80	10.47	21.76	24.84	22.66	23.29	27.29	31.56	34.64
Portugal	1.52	1.98	1.46	3.59	5.09	4.49	4.59	5.07	6.24	7.02
Spain	2.52	5.86	4.64	11.30	12.70	10.65	10.76	11.92	14.97	17.10
Sweden	7.14	12.44	9.61	20.81	21.68	20.18	18.39	20.23	25.19	28.42
Switzerland	6.03	10.96	9.55	20.63	28.99	21.02	21.60	23.81	27.83	30.26
United Kingdom	3.35	7.52	6.22	12.61	13.79	16.73	16.75	18.25	21.20	24.71
Trade-weighted measures (2,3)										
All 31 foreign economies.. less Brazil, Czech Republic, Hungary	3.85	6.54	6.65	11.90	15.05	13.78	13.43	14.00	16.28	18.02
	3.85	6.54	6.65	11.90	15.11	14.06	13.71	14.29	16.63	18.41
OECD (4,5)	4.16	7.05	7.12	12.69	15.93	14.73	14.34	15.03	17.58	19.51
Europe (6)	4.99	9.67	7.85	17.05	21.50	18.08	18.11	19.80	24.10	27.08
European Union-15 (7)	4.92	9.59	7.74	16.84	21.40	18.13	18.12	19.78	24.14	27.17
Asian NIEs (8)	0.49	1.14	1.61	3.69	6.59	7.07	6.82	7.05	7.62	8.32

New Plants... *(From previous page)*

two billion people having become infected at some time in their lives, says the company. Joint venture partners in the deal include Hefei Life Science & Technology Investments and Development and Polish biopharmaceutical company Bioton.

3M has announced plans to build a liquid crystal display (LCD) optical film manufacturing facility in Wroclaw, Poland, to support the fast-growing LCD television market in Europe. The plant, about 340 kilometers from Warsaw, is located near Philips. 3M has also expanded its LCD facilities in Menomonie, Wisc., Decatur, Ala., and has recently completed construction of new plants in Kansai, Japan; Suzhou, China; Tainan, Taiwan; and Hwaseong and Naju, Korea.

Pfizer International has signed a contract with the India-based drug manufacturer Nicholas Piramal Ltd. The company will perform contract manufacturing-related research and development services for at least seven years, says Nicholas Piramal.

Bodine Aluminum, a subsidiary of Toyota, is finishing construction of a new 85,000-square-foot addition to its engine casting plant in Jackson, Tenn. The company, based in St. Louis, produces aluminum cylinder heads, cylinder blocks and other castings for vehicles made by Toyota in the United States.

Samsung has announced plans to open a new cell phone handset manufacturing plant in Gurgaon, Haryana, India. The plant will have an initial production capacity of one million cell phones per year, with plans of increasing that number to 20 million units by 2010. The plant will employ 200 workers to start and become Samsung's "manufacturing hub" for southwest Asia, says H.C. Ryu, director of Samsung's India telecom division. The plant will tap into the software R&D facility Samsung has created in Bangalore to produce custom products for the fast-growing Indian market. Samsung has 10 percent share in the Indian mobile phone market and expects that to grow to 18 percent by next year. Samsung will import components for its new India facility, but has told suppliers that it wants them to open their own plants nearby.

Deconstructing The U.S. Space Business: Government Policy In Search Of A Purpose

BY ROBBIN LAIRD

The U.S. space business is being ripped apart by a combination of market forces, U.S. governmental policy and challenges from new foreign government policies and competitors. The deconstruction of the U.S. space business is clear; the outcome is not.

Is this going to be an area where the U.S. can demonstrate leadership in an increasingly globalized market or will conflicting policies lead to industrial decline and deflection of U.S. capabilities to provide for global leadership? One thing is certain — the U.S. has abrogated the commercial market as a way to provide for the means to pay for its various space policies.

In the 1990s, it was hoped via the Evolved Expendable Launch Vehicle (EELV) policy that commercial launches would amortize the cost of government launches. It was envisaged that a satellite communications and data boom would provide for global networks, which the U.S. government could leverage as well. It was hoped that U.S. leadership would be shaped by the ability of U.S. companies to lead in the commercial marketplace and to use that leadership as a way to generate support for the United States Government (USG) to reshape its space capabilities and policies.

The satellite boom never happened; the rationale for the EELV policy eroded over time. We are now left with a vanishing U.S. presence in the commercial marketplace, and the recrafting of U.S. government policy to meet its space needs largely through its own funding.

But this is coming at a time when the U.S. is meeting increasing challenges from other space powers. Because the commercial route to leadership has vaporized, the only remaining route is either global partnering based in part on enlightened U.S. space policy leadership or on a transformed U.S. government space policy, which integrates its various policies seamlessly into an effective transformed capability. Neither is happening.

The United States is increasingly facing the stark choice of paying for its capabilities in isolation from global collaboration and, even more significantly, facing the possibility of putting in place policies that cannot leverage other governments or foreign business investments and capabilities.

The commercial market is dominated by subsidized Russian launch vehicles. With the end of the launch quotas in the mid-1990s, the Russians and Ukrainians now dominate the commercial launch market. Foreign providers dominate the satellite services businesses as well. Eutelsat and Intelsat are the key players. When the DOD goes anywhere in the world today in the current market conditions it uses a significant commercial sat com capability; but because it is largely foreign owned there is strong resistance to building long-term relationships with foreign suppliers. The goal is to build an alternative U.S.-only government managed transformational communication system.

At the same time, U.S. hardware providers to the commercial market are being pushed out by U.S. government technology control policies. Historically, U.S. companies have been major suppliers to European satellite companies, but because of ITAR the Europeans have pursued alternative sourcing to provide for their needs.

The inability of U.S. firms to hold their own in the commercial marketplace has meant that their primary customer is the USG. But here the contradictions of USG policy are creating challenges as well. Above all, the needs of NASA and the U.S. military are not converging: the needs of the national security community are not in harmony on how best to provide for capabilities with scarce funds.

"The commercial route to leadership has vaporized."

In late 2004, the Bush administration tried to harmonize the launch requirements of NASA and the Pentagon by calling for use of the EELV launchers for both communities. But the new NASA Administrator, Mike Griffin, has rejected this approach. He has done so on solid grounds — his needs in pursuing the new space exploration vision places a premium on assembling capabilities in space with a minimum number of launches. He opted for use of shuttle-derived launch components to shape his new launch vision. This means that he will use Alliant Tech Systems (ATK), and not Lockheed or Boeing launchers.

At the same time, the demands for the EELVs by the USG are going down on the national security side as well. The high-cost of national security satellites has led to a reduction in the numbers of sats to be launched. The Pentagon is likely to opt for dual manifest launches for its key GPS modernization program.

The Pentagon, under the influence of congressional pressure, is moving in the direction of pursuing smaller launchers in providing for a "responsive" space capability. Such a capability would rest upon the rapid launch of small satellites to provide for tactical surge requirements. The military is also increasingly relying on new means to provide for surveillance capabilities both via manned and unmanned airbreathing systems.

(Continued on next page)

Space...(Continued from page eight)

The result of all of these changes is to reduce demands for EELVs. The logical outcome of this position would be for the government to choose between Lockheed or Boeing as the single supplier for national security space. Lockheed is hampered by the use of the Russian RD-180 engine; Boeing is hampered by the legal and ethical problems flowing from charges of using stolen data in shaping its winning bids on EELV.

The answer: a proposed joint venture between Lockheed and Boeing to provide for the national security community's launch needs. But the proposed joint venture lacks fiscal and management logic. Fiscally, a shift is required whereby the government would pay both for the launch infrastructure and launches of the EELV systems. Formerly, the government would pay only for the launches. From a management point of view, three launch systems would be co-managed with the need for all three not obvious.

The justification for this joint venture from the government's point of view is to provide for "assured access" to space. But assured access to space has never been provided by the combined LMC and Boeing EELV systems. The USG has never paid for common fairings for national security satellites to operate interchangeably across the satellites. The current strike by Boeing engineers has blocked the USG from launching systems currently on the launch pad with no prospect of moving them elsewhere for launch.

The NASA and Pentagon launch decisions are inevitably reshaping the relationships among Boeing, Lockheed and ATK. The shift in emphasis towards responsive space could reinforce the position of launch providers such as Orbital as well.

The point left hanging is simply this: what does the USG wish to do with regard to the future of its space launch policy? How will it work with the future commercial space community?

The latter question is posed by the challenges of using space communications for both homeland security and global defense requirements. The Katrina crisis underscored how important satellite communications are for crisis management and security. Without Iridium and Globalstar systems, connectivity would have been lost in the region during the height of the crisis. But there is no policy in sight that would sustain these or similar systems for the future.

The Pentagon's proclivity for nurturing its own protocols and systems has led to its desire to have a transformational communications system whereby data and voice can be managed over secure systems that only it controls.

No one would argue against the need for key assets to provide for secure communications; but these systems already exist and work. They could be reinforced by an evolutionary acquisition strategy. The military and the USG could then be in a position to support Globalstar and Iridium type systems for its global use as a course of policy, not an accident of policy.

Enter the NASA exploration architecture. NASA Administrator Griffin has shaped an approach to implementing President Bush's space exploration policy. This approach rests on recapturing from the private sector many of the functions given to them in the Clinton administration and re-energizing the NASA centers.

The problem with this approach is that the primes have the core engineering talent, the supply chain management skills and the historical resident expertise in a number of key areas, such as planetary rovers, heat shields, etc. There is a need to shape a new public-private partnership to forge effective leadership of an exploration enterprise.

The core new program in the enterprise approach is the replacement vehicle for the shuttle, the Crew Exploration Vehicle (CEV). Currently two teams are competing to become the primes in the CEV program. Lockheed Martin and Northrop-Grumman are each developing competing designs for the program. Both have international partners, but NASA is pressuring both to drop their foreign partners in order to ensure that the U.S. controls the "critical path" technologies required for the exploration vision. This is hardly the best way to allow industry to shape global partnerships, which will allow for true U.S. leadership in the 21st Century.

NASA has also budgeted $500 million for the new space companies to compete to provide launch services to resupply the space station. If these companies can demonstrate systems capable of providing for this function, Administrator Griffin promises to buy services for station resupply. The only problem is that the commitment to complete the space station is uncertain. If the space shuttle cannot fly a large number of remaining missions (17 or so), the space station cannot be completed. The cost of doing so could well come at the expense of the space exploration vision itself.

In order to break this conundrum, the USG needs to reshape its space business policy. It needs a clear commitment to the business of space and to reshaping an overall public-private partnership. If it does not do so, it will be difficult to protect U.S. jobs and capabilities in the space sector and make it increasingly impossible for U.S. companies to forge global partnerships in shaping the industry of the future.

The rise of India, China and Japan in space, combined with the growing capabilities of Europe, could create a condominium outside of U.S. influence. U.S. business would be reduced to providing contract support to a government of diminished influence and capabilities in the global space environment. U.S. innovation, imagination and business acumen are best served by a global mission, not pursuit of a one-sided vision of superpower control.

— Robbin Laird is director of ICSA LLC, an Arlington, Va.-based firm specializing in aerospace and defense. He can be reached via e-mail at RLaird@aol.com.

America's Superpower Dilemma

BY REP. DONALD MANZULLO & SHEILLA RONIS

The world systems we have known over the last several decades have experienced tectonic shifts. Since the end of the Cold War, the changes have accelerated. Our future is now uncertain and the Global War on Terrorism has only exacerbated this situation.

At the end of World War II, General George Marshall said, "We are now concerned with the peace of the entire world, and the peace can only be maintained by the strong."

Although descriptive of another time, these words are as true today as they were then. The United States, the only remaining superpower on the planet, is concerned again with the peace of the entire world. Assuming Marshall was right, the United States must ask itself: How do we remain strong? What does "strong" mean in a world of globalization? And, what do we need to do to remain a superpower as others emerge to take our place?

As we work to assist the small business community throughout the country, it has become clear that the issues affecting it are affecting the entire nation. Small businesses are represented in every sector of the economy and in every state, county and city. As a nation, the United States cannot be strong without its backbone, the small businesses of America. The small business community represents a microcosm of the entire business community and the issues we are wrestling with in the Small Business Committee of Congress are the issues of all U.S. businesses.

These business issues facing the nation are comprehensive and need solutions. Examples include affordable healthcare, pension security, social security, trade and offset policies that don't destroy us while our companies are globally competing against companies that get help from their governments in many forms while our companies are on their own without a level playing field.

How does the nation address such complex issues? How can we solve our problems without a National Grand Strategy that looks out decades — not just the next election?

How will we plan for a 21st Century world that is vastly different from anything we have ever experienced in our nearly 230-year history?

The nation needs to develop interagency integrative mechanisms because solutions require cooperation between departments and agencies of the federal government.

Systems science may provide some approaches to problem solving. Systemic solutions permit us to step out into the next larger system or the system beyond that to look across the entire mosaic at the elements of a system, examine their interdependence and interactions to better understand the whole and its behavior.

The context in which everything exists is critical. For U.S. businesses, that context includes several system layers. First, is the U.S. economy, then the overall global economy, and finally the global geo-political-economic-military-diplomatic system that the world operates in.

We look at the economy as an element of our national power — the sum total of our country's ability to use our power to shape world events, and ultimately, implement our National Security Strategy.

But the global system is a large complex adaptive system in the classic sense, and its non-linearity makes it a messy system in the truest Russell Ackoff sense.

(Continued on next page)

NIST Director To TA's Rescue

William Jeffrey, confirmed in July as Director of the National Institute of Standards and Technology (NIST), has added the role of Acting Under Secretary of Commerce for Technology. In the latter capacity he will head up the Technology Administration (TA), NIST's parent bureau at the Department of Commerce, on a provisional basis.

Pending the confirmation of Robert Cresanti, vice president for public policy at the Business Software Alliance, to the under secretary position, Jeffrey is to "perform all the functions of the office," Commerce Secretary Carlos Gutierrez said in announcing the appointment.

The post was left vacant when Michelle O'Neill, who had acted as Deputy Under Secretary for Technology since mid-June, left TA for the post of Deputy Under Secretary of Commerce for International Trade, which she assumed on Dec. 12.

Cresanti was named as Under Secretary of Technology by President Bush in November. But the Senate Commerce Committee has yet to hold a hearing on his nomination and, with no confirmation sessions now showing on its schedule of upcoming events, Cresanti appears unlikely to come before the panel soon.

TA, structured with four leadership positions, is at present left with only one that is filled by a permanent appointee: The post of Deputy Assistant Secretary for Technology Policy remains in the hands of Dan Caprio.

Ben Wu left the Assistant Secretary for Technology Policy job last month after being named by Maryland Gov. Robert Ehrlich (R) to serve in that state's Department of Business and Economic Development. Effective Nov. 29, Wu took on the dual role of Assistant Secretary for the Capital Region and Senior Advisor for Technology Policy.

O'Neill's new appointment brings her back to Commerce's International Trade Administration, where she served from 1987 until being named Deputy Under Secretary for Technology in July 2004. She became Acting Under Secretary in the wake of Phil Bond's May 2005 departure from that office.

Dilemma...(From previous page)

"Systems are not the sum of their parts, but the product of their interactions," according to systems theorist Ackoff. To understand a system, you do not break it down into its component parts, you must look at the whole that is created when the pieces fit together.

If the system we are looking at is the U.S. economy, what is the next larger system? Ideally, it should be the holistic, integrated National Strategy of the United States; all its policies, foreign, economic, diplomatic, military, education, energy, and so on... woven together to create a holistic vision of who we are and who we need to become in the future.

Unfortunately, we do not have such a strategy or vision — nor do we have any mechanism to develop one anywhere within the federal government. How can we possibly be effective at shaping our environment, or developing effective plans for shaping, if we have no way to think through the whole and think in long time horizons beyond the next election?

There will be little ability to secure our homeland, and even less ability to protect American interests around the world without American leadership. But that leadership requires a holistic, integrated and, most likely interagency planning and decision-making apparatus.

The future global geopolitical environment and internal environment in the United States need to be effectively "shaped." In addition, a contemporary role for the U.S. in the world needs to be developed.

That vision needs to include all elements of national power.

We may want to use the creation of the National Security Strategy to more effectively develop the integrative mechanisms and formal interagency processes and doctrine that we will need to ultimately develop our National Strategy, including one to ensure a healthy market-oriented, innovative economy that addresses the defense of the nation, ensures economic as well as military security and what it will take to keep us strong — an integrated set of policies that include:

- Economic security and job creation mechanisms;
- Education;
- Strong military capabilities;
- Leadership in innovation and R&D;
- Energy;
- World class manufacturing capabilities;
- Diplomacy;
- Trade;
- Health care, pension and social security reform; and
- Even an industrial policy.

In other words, all the elements of national power that will keep us strong.

This requires executive leadership across the Federal Government, and the Congress must play a role. Congress should seek to fund interagency projects or missions that can even cross Congressional committees.

If we want a future in which liberty, prosperity and peace are increasing throughout the world, the U.S. must remain a superpower.

Failure to develop a U.S. Grand Strategy that ensures our superpower status may yield a future where China or another emerging power will dictate to the world including us.

David Dollar, World Bank country director for China, estimates that China will overtake the U.S. as the world's largest trading nation within 15 years and be the world's largest economy within 25 years, provided it can deal with its internal inefficiencies, ranging from the financial sector to water pollution to rising income inequality.

Failure is not an option.

— Rep. Don Manzullo is a Republican representing the 16th district in Illinois and is Chairman of the House Small Business Committee. Sheila Ronis is President of the University Group in Rochester Hills, Mich.

Tech Sector Back On Track

The U.S. technology sector has rebounded from its freefall in 2001, according to a new "U.S. Tech Sector Index" created by the Information Technology Association of America and Forrester Research. IT employment, spending and vendor profits and revenues "are generally healthy and growing," says the quarterly benchmark, which wants to be the "the most comprehensive measure of the tech economy available."

But the tech sector is not yet in period of "strong steady growth," according to the index. "Don't weep for the U.S. tech sector, but don't break out the champagne either," says George Colony, chairman and CEO of Forrester Researcher. "Save it for 2008." The two organizations hope the index becomes as popular as the "U.S. Consumer Confidence" report.

MANUFACTURING & TECHNOLOGY NEWS (ISSN No. 1078-2397) is a publication of
Publishers & Producers, P.O. Box 36, Annandale, VA 22003. On the Web at: www.manufacturingnews.com.
PHONE: 703-750-2664. FAX: 703-750-0064. E-MAIL: editor@manufacturingnews.com.
Annual Subscription Price: $495. Frequency: Twenty-two times per year.
Editor & Publisher: Richard A. McCormack (richard@manufacturingnews.com)
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Reports & Analysis

THE WISCONSIN MANUFACTURING STUDY: AN ANALYSIS OF MANUFACTURING STATEWIDE AND IN WISCONSIN'S SEVEN ECONOMIC REGIONS says Wisconsin manufacturers have to make a monumental shift from "old-economy" manufacturing that stresses low-cost high-labor and low-profit commodities to high value added, low-labor and high-profit products. "Wisconsin is ready, but it is not assured of success in making or surviving this transition," says the study. The 435-page report was prepared for the Wisconsin Manufacturing Extension Partnership by The MPI Group. It is located at http://www.wmep.org/manufacturingstudy.pdf.

THE STATE OF WORKING ILLINOIS from the Center for Tax and Budget Accountability and the North Illinois University says that some job changes in the state have been for the better "but many have been for the worse" over the past 15 years.

"Illinois is at a crossroads," says the report. "As the state's traditional industries scale back in the face of global competition, new technologies and new industries arise that require different skill sets and, in many cases, pay lower wages.

These economic changes will impact everything from the type and level of skills that workers will need to the state's fiscal health and the demand for public education, transit, healthcare and physical infrastructure. How Illinois responds will impact thousands of families, seniors, businesses and the state's long-term economic competitiveness."

The report, which aims to provide Illinois policymakers with good data upon which to make decisions, says the state lost 222,500 manufacturing jobs between 1990 and 2005, a decline of 24 percent. Over the same period, jobs in professional and business services, education, health services, leisure and hospitality have increased by 37.1 percent, adding more than 559,300 jobs.

High-wage service jobs especially in the information sector "appear to behave more like the manufacturing industry, with jobs lost due to productivity gains primarily replaced by jobs in the lower-wage service industries," says the report.

Manufacturing is expected to remain a major source of employment in Illinois, with a projected workforce of 700,000 workers in 2012, "which is only a net loss of less than 7,000 jobs from current levels," says the 94-page study located at http://www.stateofworkingillinois.niu.edu/swil/pubs/swil_report.pdf.

EXPANDING THE FRONTIERS OF OUR DIGITAL FUTURE: REDUCING SOFTWARE PIRACY TO ACCELERATE GLOBAL BENEFITS from the Business Software Alliance says cutting the global piracy rate of 35 percent by 10 percentage points over four years "could generate 2.4 million new jobs, $400 billion in economic growth and $67 billion in tax revenues worldwide."

Every 1 percentage point drop in software piracy could yield $40 billion in economic benefits and "jumpstart growth in the global information technology sector," says the report. Although the global IT sector is currently projected to grow 33 percent through 2009, a 10-point reduction in software piracy could spur a growth rate that is 45 percent greater than currently projected.

If the world software piracy rate were cut by 10 percentage points over four years, the United States would see a $125-billion boost to its economy, says the study. A 10-point reduction in software piracy in China could create 2.6 million new IT jobs there by 2009. Russia, which has the world's fifth highest software piracy rate in the world at 87 percent, could see its IT industry triple in size, from $9.2 billion today to $30 billion in four years.

The study is located at http://www.bsa.org/idcstudy.