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The Importance of Entrepreneurship to Economic Growth, Job Creation and Wealth Creation - United States Speaker

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MR. MORGENTHALER: Thank you very much, Henry. It is very nice to be with you this morning, and thank you for inviting me. Henry assigned me the topic of the relationship of entrepreneurship to economic growth, job creation, and wealth. This is a subject that is relevant to me as I phase down in the venture business.

The formal venture institutional business really started in 1945, right at the end of World War II. I came back out of the service and became an entrepreneur at that time. So I have been on either side, as both an entrepreneur financed by venture capital and working with venture capitalists. And for the last 39 years I moved across the table. I stopped making an honest living as an entrepreneur and became a venture capitalist.

Question: How does entrepreneurship relate to economic growth, job creation and wealth? Sadly, the answer is that entrepreneurship is nearly everything. This was a very hard thing to get our United States Congress to

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believe back in the early 1970s when we formed the National Venture Capital Association, of which I was very active in the formation, and in getting a lot of the legislation changed as well as the capital gains tax rolled back. At that time, the view of our leaders in the country, and certainly the view of our Congress, was that the big companies were nearly everything; they were where jobs were created, they were where wealth was created, and the little companies were kind of a nuisance. In a way, when I came out of graduate school in 1941, that was the attitude at the time. As we dug deeply into this we finally pointed out this fallacy to Congress and got many of the changes that were needed made. The differences were that the large companies were not increasing employment. In many cases, they were moving their operations, particularly their manufacturing operations, out of the older areas, out of the high cost areas, moving them to the lesser cost areas and subsequently moving them outside of the country. It became very important to understand this phenomenon, and the country was very slow to understand it.

It is the sad fact that entrepreneurship is nearly everything – and this bodes badly for the economically mature regions of the country, and even of the world – because one of the characteristics of a mature region is that entrepreneurship tends to fall off. Now why is this true? And, why is it so little is understood by the leadership of the successful regions (underscore successful) when they are at their peaks and have the most resources to do something about it? Not only do they lose new companies but, more disturbingly, they show that the regions' industries are mature.

To understand this, it is necessary to think clearly about some practical, realistic, and fundamental factors. The first is that economics drive nearly everything. Go back to the discovery of America. Columbus was an entrepreneur with a very difficult personality history tells us – not untypical

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3 Id.
4 See, e.g., id.
5 See Judith C. Blackwell, et al., Culture of Prejudice Arguments in Critical Social Science 128 (Broadview Press 2003) ("Small- to medium-sized businesses still create far more jobs than do the big transnational corporations operating in the US and Canada.").
of entrepreneurs — whose belief that the world was round gave him an opportunity to reach the riches of the Asian markets by sailing West. Columbus was almost a prototype entrepreneur. Such a person believes that he sees a business opportunity and a way to fill it, somehow collects the resources needed, and drives the project through.

The elements listed are like the legs of a stool — omit one, and the stool collapses. There must really be an opportunity — usually called an existing or potential market; a way to fill it — usually called the product or the service; the resources needed — usually called the venture capital; and the person (or people) to drive the project to success — usually called the entrepreneur. Columbus sought one opportunity but found another: America. What led multitudes to flock to it? It was rich, productive, and free land, when productive land was wealth. Nobody flocked to the Sahara Desert, where there also was free but unproductive land. Also, in America there was free


10 See BILL BOLTON & JOHN THOMPSON, ENTREPRENEURS: TALENT, TEMPERAMENT, TECHNIQUE 265 (Elsevier 2004) ("Entrepreneurs are often strongly individualistic and difficult to work with in groups.").


12 Id.


15 See Gilson, supra note 14 at 1070.

16 Id.; see also Entrepreneur, supra note 13.

17 Flint, supra note 11.


19 See DAVID PROCHASKA, MAKING ALGERIA FRENCH: COLONIALISM IN BONE, 1870-1920 152 (Cambridge University Press 1990) ("[T]he initial French response [in Algeria] was to offer prospective French settlers the inducement of free land. But relatively few accepted the offer").
timber, free furs, and the hope of gold. Of course, freedom from religious and political discrimination, desire for adventure, et cetera, also brought people. But, make no mistake – the desire for an economically better life drove most of it.

The influx of people provided markets, the flexible and relatively free society let people exercise their entrepreneurial urges without much restraint, and the huge country provided the resources. The innovation was the sudden availability of a new, rich, relatively unused continent. In England and Europe most of the land was already owned and planted. Both England and Europe were, relatively speaking, mature, and innovations were becoming more technically based, such as water-powered mills and later steam engines.

20 See C.B. Fawcett, The Extent of the Cultivable Land, 76 The Geographical J. 504, 505 (1930) ("[A]rid deserts may at once be written off as uncultivatable").
23 Sen. Mike Crapo, Profound Desire For Adventure, http://itd.idaho.gov/transporter/2005/031105_Trans/031105_Crapo.html (last visited Oct 5, 2007) ("[Americans] are the descendants of pioneers whose desire for a better life was mixed with a spirit of adventure.").
24 See generally, United States, supra note 18.
27 See Samuel C. Alessi, The Coming of the Italians to Chautauqua County, http://freepages.genealogy.rootsweb.com/~cheetah/history.html (last visited Oct 5, 2007) (explaining how the condition where "there was no land which the landless peasants could work and produce food... prevailed over most of Europe.").
29 Id.
In the United States and Canada, the innovations to exploit the vast continental resources continued. First came the canals, which opened the rich soils of the Great Plains to the East Coast and even to world markets for the grains that could be produced so much better in Ohio and the Midwest than in the flinty soils of New England. The result of the canals was that the cost of shipping a ton of grain from Ohio to New York dropped from $120 a ton to $6 a ton. From New York, cheap ocean transportation made the world markets available and drove the expansion of Midwest farming. The innovation of the railroads followed, enabled by the steam engine, bringing more flexibility and, thus, tying all regions together.

Note the theme of what I have said so far, that economics drives nearly everything, and innovations, of some kind—new beliefs, new concepts, new inventions, new resources, and new ways of doing things—are what stimulate the economics of a region, a country, or even the world.

Not for nothing were the 1,000 years after the fall of the Roman Empire called the Dark Ages—beliefs became rigid and compulsory, and new...
ideas were frozen out. People like Galileo and others were confined to house arrest and punished for offering new ideas. It was a time of almost total lack of innovation.

But, back to America. The railroads, enabled by the steam engine, tied the country together cheaply and flexibly. Think of what that innovation did! For the first time in the history of the world, man could travel faster than the speed of a horse.

The railroads were quickly followed by a host of lesser but important innovations – the telegraph, the telephone, electrical lighting to replace kerosene lighting. John D. Rockefeller got rich on kerosene. He didn’t get rich on gasoline; it was the lighting empire that built the Standard Oil wealth. Gasoline in the beginning was a dangerous and unwanted by-product.

Other lesser innovations: skyscrapers were enabled by the innovation of the elevator; electrical power came along and replaced the water wheels. The reason New England was the center of the wool and manufacturing industry, the weaving industry, was because it had so many small rivers with falls in them, so that you could have water powered wheels, which, through a

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41 See generally id.
44 See Goddard, supra note 37, at 31-2.
45 Id. (“Before the iron horse, the flesh-and-blood equine had limited how people related to time and space.”).
48 Id.; see also Standard Oil Co. (Indiana), ENCYCLOPEDIA OF CHICAGO, http://www.encyclopedia.chicagohistory.org/pages/2863.html (last visited Oct. 5, 2007) (“During these years, the company’s main product was kerosene”).
50 Jean Gottmann, Why the Skyscraper?, 56 GEOGRAPHICAL REV. 190, 191 (1966) (“The multistoried building of considerable height was made possible by a remarkable contraption, the passenger elevator”).
51 See S. SRINIVASAN & C. YANG, FUEL CELLS FROM FUNDAMENTALS TO APPLICATIONS 620 (Springer US 2006) (“[T]he hydraulic turbine replaced the water wheel.”).
series of belts and pulleys, opened up the factories.\textsuperscript{52} These were replaced originally by steam engines, which meant you could put the factories where you wanted, and then electrical power gave you more flexibility.\textsuperscript{53} And there were countless other lesser innovations that gave mankind benefits which he needed or he thought he wanted. The mold board plow\textsuperscript{54} made farming the fertile but heavy prairie soil practicable.\textsuperscript{55} The cotton gin made that crop useful; \textsuperscript{56} and the list goes on and on. \emph{Innovations, innovations, innovations!} That's the most important word I will use today. And the world has discovered the concept.

Earlier this week I conferred by video conference with a group from Singapore who met in our Silicon Valley office. They were told to call on me by the Singapore Minister of Finance. We manage a large amount of money for the Singapore government.\textsuperscript{57} This group, which was from the Singapore National Research Foundation,\textsuperscript{58} was put together to coordinate the national R\&D,\textsuperscript{59} innovation and enterprise efforts of Singapore, and advance its economy.\textsuperscript{60} That was stated in their mission.\textsuperscript{61} They advise the Research, Innovation, and Enterprise Council,\textsuperscript{62} chaired by the prime minister himself.\textsuperscript{63} Think of our President or the Prime Minister of Canada personally chairing a research and innovation council! The goal of the group was to

\textsuperscript{52} See Robert B. Gordon, \textit{Cost and Use of Water Power during Industrialization in New England and Great Britain: A Geological Interpretation}, 36 ECON. HIST. REV. 240, 241-42 (1983) ("[The] concentration of many water-power mills in an industrial city was possible in only those few localities where power canals could be built to distribute water from large dams, as in the Massachusetts towns").

\textsuperscript{53} \textit{Id.} at 242 ("[S]team power... permit[ted] growth above the bounds set by the capacity of the hydraulic power systems... [and] towns could chose between two competing power sources").

\textsuperscript{54} Lowry Nelson, \textit{The American Rural Heritage}, 1 AM. Q. 225, 227-228 (1949).

\textsuperscript{55} See \textit{id}.

\textsuperscript{56} See generally Paul Finkelman, \textit{The Founders of Slavery: Little Ventured, Little Gained}, 13 YALE J.L. \\& HUMAN. 413, 419 (2001); see also History of Cotton, http://www.cotton.org/pubs/cottoncounts/story/index.cfm (last visited Oct 5, 2007) ("[T]he cotton gin in the U.S. paved the way for the important place cotton holds in the world today... [because it] could do the work 10 times faster than by hand.").


\textsuperscript{60} \textit{Id}.

\textsuperscript{61} \textit{Id}.

\textsuperscript{62} \textit{Id}.

\textsuperscript{63} \textit{Id}.
understand more of the enterprise eco-system in the U.S., to try to learn what makes the U.S. innovation system so successful, and to try to identify further growth areas for their future programs.\footnote{See generally \textit{id.}}

Next week I am chairing a conference in Washington put on by the Science, Technology and Economics Board of the National Academies,\footnote{See \textit{THE NATIONAL ACADEMIES}, Globalization of Innovation: Emerging Trends in IT, Biopharma, and Finance Conference, http://www.nationalacademies.org/gateway/pga/3765.html (last visited Sept. 25, 2007).} which consist of the National Academy of Science, the National Academy of Engineering, and the Institute of Medicine.\footnote{The National Academies, http://www.nationalacademies.org (follow “About the National Academies” hyperlink) (last visited Sept. 26, 2007) (“Four organizations comprise the Academies: the National Academy of Sciences, the National Academy of Engineering, the Institute of Medicine and the National Research Council.”).} This is a free conference to advise public policy makers\footnote{See generally \textit{THE NATIONAL ACADEMIES}, supra note 65.} and held at one of the National Academy’s buildings in Washington.\footnote{See id.} You are all welcome to attend. The purpose of this conference is to sum up a study we have been doing on Global Innovation Systems, to help U.S. government policy makers ascertain where the U.S. stands, compared to the rest of the world.\footnote{See Board on Science, Technology, and Economic Policy, The National Academies, http://www7.nationalacademies.org/step/Globalization%20of%20Innovation.%20April%202007%20Meeting.html (last visited Oct. 5, 2007).} We are financed partly by Congress,\footnote{See Organization of the National Academies, http://www.nationalacademies.org/about/faq1.html (last visited Oct. 6, 2007) (“The federal government funds about 85 percent of the institution’s work.”).} and we are running several conferences\footnote{Id.; see also Board on Science, supra note 69.} to sum up a good deal of the work we have done.\footnote{Board on Science, supra note 69 (“[The] Board has commissioned papers on 11 industries ranging from semiconductors to biotechnology to venture capital.”).} We have studied about a dozen of the most important sectors of the U.S. economy\footnote{Id. (“They are concentrated in 3 sectors -- information technology (software as well as hardware), life sciences-based industries, and financial services.”).} and will report briefly on all of these, and in more detail on information technology, life sciences, and financial services.\footnote{Id. (“They are concentrated in 3 sectors -- information technology (software as well as hardware), life sciences-based industries, and financial services.”).}

The preliminary reports I am getting worry me. Why? I fear too many of our industry sectors are too complacent. While I don’t expect the bottom to fall out over the next several years, the long-term outlook is sobering. Why? Let’s go back in history a bit.

Sixty-six years ago I got my master’s degree from MIT. Three years before we were scared we would not be able to get jobs because of World
War II. Luckily, the demand had picked up and engineers were hot property.\textsuperscript{75} At that time, the automobile was the economic driver of the U.S. economy,\textsuperscript{76} and the hot jobs were in Detroit,\textsuperscript{77} Cleveland,\textsuperscript{78} Pittsburgh,\textsuperscript{79} and the other cities now called the Rust Belt.\textsuperscript{80} The semi-conductor had not been invented,\textsuperscript{81} so the Electronic Age had not started.\textsuperscript{82} Boston was a backwash for jobs.\textsuperscript{83} The Silicon Valley, Austin, and the Research Triangle did not exist.\textsuperscript{84} Shortly, I went off to war as a Captain of Engineers throughout the African and Italian campaign. When the war was over, I joined a group of people starting a company in Erie, Pennsylvania, and became what we today would call a serial entrepreneurial manager,\textsuperscript{85} helping to build up several very small companies. Today we seek serial entrepreneurial managers. Today, we seek such people to start companies for us. In those days it was thought people like me couldn’t hold a job. Things change.

\textsuperscript{75} Robert P. Morgan, et. al., \textit{The Changing Nature of Engineering}, ASEE PRISM (1998), available at http://findarticles.com/p/articles/mi_qa3797/is-199805/ai_n8803619 ("After World War II, several factors, including the beginning of the Cold War and a postwar economic boom, heightened U.S. demand for engineers and led to large increases in the numbers of practicing engineers, engineering students, and engineering fields and subfields.").


\textsuperscript{77} Id.

\textsuperscript{78} See, e.g., Janet H. Cho, \textit{The Homefront}, CLEV. PLAIN DEALER, Sept. 5, 2005, at E1 (explaining "Cleveland’s booming wartime factories.").


\textsuperscript{80} Id.


Institutional venture capital came into being right after the war. 86 In late 1945, Jock Whitney started J. H. Whitney & Company with $10 million of family money in New York. 87 Today venture firms spill that much money. 88 About that same time, Karl Compton, president of MIT, and Senator Ralph Flanders felt the need for a fund to finance the early stage technology 89 coming out of research in radar and vacuum tube electronics. 90 Remember that was before the semiconductor. 91 They wanted to back new ideas and finance young engineering people, and hired General George Doriot, a professor at the Harvard Business School to run it. These were the two original institutional venture capitalists. 92

Whitney, looking for managers with entrepreneurial backgrounds, found me in 1950, and we had a 7-year courtship, involving several of their companies. I finally took the presidency of the fourth one in 1957 – the American licensee of a very small British multi-national, which we ultimately built into 57 corporations, manufacturing in 22 countries and warehousing and selling in about 75 countries.

Prior to 1945, venture capital had primarily come from wealthy families, corporations, and banks that made higher risk loans. 93 It had a very long history, of course. Sea voyages were financed by wealthy merchants who shared in the profits of the cargo, if the ship got back. 94 Fortunes were made by firms like the East India Company, 95 but, there were charlatans as well. 96 When I left school, I thought an entrepreneur was a French swindler. After 39 years as a venture capitalist, I’ve learned they’re not all French.

Legend has it that Queen Isabella pawned her jewels to finance Columbus’ voyages. 97 When U.S. Steel became public, a number of Andrew

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87 Id.
88 See, e.g., id.
89 Id. at n. 69 (explaining how they founded AR&D).
91 See Simnacher, supra note 81.
92 Bristow, supra note 86, at 404.
93 Id. at n. 66.
94 See, e.g., Charlie Cray & Lee Drutman, Corporations and the Public Purpose Restoring the Balance, 4 SEA. J. SOC. JUST. 305, 309 (2005).
95 Id.
97 Bristow, supra note 86, at 404 n. 66.
Carnegie’s partners became millionaires, and Pittsburgh, for a time, became the venture capital center of the country. Today, such people are called “Angel Investors.”

A few more facts about venture capital:

- There are about 700,000 new businesses started each year in the U.S., according to tax returns, including all the small 1- or 2-person service businesses. Of those, a majority do not last 5 years.

- Professional venture capital funds, like ours, finance only about 1,000 of these, or 1 in 700. The number is not very precise, but whether it is 1 in 500 or 1 in 1,000 is not very important, we don’t finance many.

- The importance of venture capital institutions is that they finance most of the high growth, exciting companies that get started.

A few numbers about the industry:

- A large firm, like us, will see more than 1,000 business plans a year.

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98 See generally Mark Skousen, This Icon of Capitalism Had The Answers, http://www.mskousen.com/Books/Articles/020licon.html (last visited Oct. 2, 2007) (explaining how one of Carnegie’s first acts after U.S. Steel went public was to create a $5 million pension plan); see also Walter Adams & James W. Brock, The New Learning and the Euthanasia of Anti-Trust, 74 Cal. L. Rev. 1515, 1553 n. 171 (1986) (explaining how U.S. Steel was formed into “the nation’s first billion dollar corporation.”).


104 Id.

105 JOHN L. NESHEIM, HIGH TECH START UP, REVISED AND UPDATED: THE COMPLETE HANDBOOK FOR CREATING SUCCESSFUL NEW HIGH TECH COMPANIES, Dust Jacket (The Free
Five years later – on national statistics – we will wish we had never seen 996 of the 1,000. Why? Because we will not invest in 990, so we wasted our time. Of the 10 we did invest in, we will lose all our money in 3, plus more money we put in hoping to save the first money. On another 3 we will make so little it was not worth the time and risk. That is the 996 we wished we could have avoided.

Three we will make a good return on, and one will be a big winner, a gorilla, if we are lucky. It is these few big winners that keep us in the early-stage venture business.

Private equity, the highly leveraged purchase of mature businesses, is a totally different activity. Losses are much fewer. The debt is the big risk, and huge winners are extremely rare. At the moment, this is highly popular and is

Press 2000) ("A typical venture capital (VC) firm reviews 1,000 high tech business plans a year; it funds about six of them.").

See generally Angel Investing, supra note 103; see also MinorityFinance.com, http://www.minorityfinance.com/vc.html ("A VC firm may see 1,000 business plans in a year, and only fund 10.").

See Klein, supra note 101 ("30% lose money.").

See id. ("30% break even.").

See generally id. ("39% are profitable.").


LINS, supra note 111 ("[T]he nature of the investment process [for private equity] usually differs substantially from that of a hedge fund and other investment vehicles.").

See generally id.

Jason Kelly, Private Equity Moguls Feeling the Pinch, BUS. REPORT, Oct. 2, 2007, available at http://www.busrep.co.za/index.php?fSectionId=4&ArticleId=4060473 (commenting on "the risky debt that private equity firms rely on to fund acquisitions.").

almost certainly being overdone.\footnote{See LINS, supra note 111 ("[A] growing number of financial institutions engage in private equity or merchant banking activities by establishing or investing in private equity funds.").}

I wish I could say that venture capital institutions are the most important thing in regional economic development, but it simply isn’t true. When Ohio became great in the late 1800s and early 1900s,\footnote{See generally George W. Knepper, Ohio’s Historic Properties, OH. HISTORICAL SOC., Ch. 3, available at www.ohiohistory.org/resource/histpres/docs/ThePlanCh3.pdf.} there were no institutional venture capitalists.\footnote{Timothy J. Sturgeon, Understanding Silicon Valley: Anatomy of an Entrepreneurial Region, Ch. 1 (Martin Kenney, ed. Stanford University Press 2000) available at http://ipc-lis.mit.edu/globalization/Silicon%20Valley.pdf at 1.} Silicon Valley took off when Bill Shockley took the semiconductor there in 1957,\footnote{See generally id.} and there were no institutional venture capitalists in that region either.\footnote{See id.; see also Where is Silicon Valley and How did it get its Name?, http://www.brighternaming.com/Silicon_Valley_name.html (last visited Oct. 5, 2007) ("Before Silicon Valley got its moniker, it used to be a luscious fruit valley.").} I looked at that region in 1949 and I found it was a lovely place to live, but I could pick fruit or raise vegetables for a living there.\footnote{Bill Hewlett, The Human Side of Management, 3 SMECC VINTAGE ELECTRICS 1, available at http://www.smecc.org/the-human-side-of-management_-_bill_hewlett.htm (Hewlett admitting “we were very small and insignificant.").} There was relatively no high technology.\footnote{Interview, Sanford Robertson (1997), http://www.businessweek.com/1997/34/trans34/robertso.htm (finding Silicon Valley’s “technology was fueled by the semiconductor industry.").} Fred Terman at Stanford was trying to get Bill Hewlett and people like that going, but they were very small.\footnote{The Time 100, Scientists and Thinkers, TIME MAGAZINE, http://www.time.com/time/time100/scientist/profile/shockley03.html (last visited Oct. 6, 2007).}

Silicon Valley was driven by the semiconductor.\footnote{See Manuel Castells & Peter Hall, Technopoles of the World: The Making of Twenty-First-Century Industrial Complexes 16 (Routledge 1994) ("[Shockley] moved to Palo Alto – because, among other reasons, his aged mother lived there.").} Bill Shockley was financed by Arnold Beckman out of Los Angeles,\footnote{The Traitorous Eight Traitorously Leave Shockley Semiconductor, PBS, http://www.pbs.org/transistor/album1/eight/index.html (last visited Oct. 28, 2007).} and they had a fight about whether or not it went to San Francisco or Los Angeles (where Arnold wanted to put it,) but Bill Shockley’s mother lived in Palo Alto, and that’s where he went.\footnote{See LINS, supra note 111 (“[A] growing number of financial institutions engage in private equity or merchant banking activities by establishing or investing in private equity funds.”).} He hired the so-called “traitorous 8”\footnote{The Time 100, Scientists and Thinkers, TIME MAGAZINE, http://www.time.com/time/time100/scientist/profile/shockley03.html (last visited Oct. 6, 2007).} – great men like
Bob Noyce\textsuperscript{128} and Gordon Moore\textsuperscript{129} – and two years later they spun out to form Fairchild Semiconductor.\textsuperscript{130} They were financed by Sherman Fairchild out of New York.\textsuperscript{131} His family had done early investing in IBM.\textsuperscript{132} Most of the semiconductor firms then spun out of Fairchild,\textsuperscript{133} including especially Intel.\textsuperscript{134} So, venture capital does not cause innovation, it follows it – anywhere and everywhere it thinks there is a business opportunity and a way to fill it.

The automobile at the end of the 19\textsuperscript{th} Century and in the early years of the 20\textsuperscript{th} Century was the greatest innovation the country had ever seen.\textsuperscript{135} It brought along the steel industry, tires, machine tools, glass, road building, gasoline, and a host of service industries, including insurance, finance, repair shops, etc.\textsuperscript{136} The Rust Belt cities became rich on these mechanical industries\textsuperscript{137} and rode them for far too long. They almost entirely missed the semiconductor industry,\textsuperscript{138} which became the real driver of the economy after


\textsuperscript{131} Id.


\textsuperscript{133} See TIMOTHY J. STURGEON, UNDERSTANDING SILICON VALLEY: ANATOMY OF AN ENTREPRENEURAL REGION Ch. 1, How Silicon Valley Came to Be at 1 (Martin Kenney ed., Stanford University Press, 2000) ("The spin-off of Fairchild Semiconductor from Shockley Transistor and the ‘Fairchildren’ that followed are widely believed to be the stimuli that set the Silicon Valley juggernaut in motion.").


\textsuperscript{136} See JAMES E. McCLELLAN & HAROLD DORN, SCIENCE AND TECHNOLOGY IN WORLD HISTORY: AN INTRODUCTION 342 (JHU Press 2006) (explaining how the "automobile industry fostered technical innovations" and subsidiary work in steel, glass, rubber, gasoline, roads, etc.).


\textsuperscript{138} See, e.g., John Markoff, Gould to Be Acquired By Nippon Mining, N. Y. TIMES, Aug 31, 1988,
1960,\textsuperscript{139} enabling a huge number of other innovations.\textsuperscript{140} The leadership of the Rust Belt cities did not realize they were missing the future, leading to the decline in their manufacturing jobs today.\textsuperscript{141}

What is the future? We are all trying to guess what will be the new, \textit{new thing}. What are the innovations that entrepreneurs will be pushing to create new jobs and new wealth? Is it nanotechnology – a technology looking for a market?\textsuperscript{142} Is it alternative fuel – a huge market looking for economically viable technology?\textsuperscript{143} Is it fuel cells? Is it some other new material, as yet undiscovered? Is it new medicines or medical devices – ones that will slow aging or cure major diseases? Or is it something no one has thought of yet? Will our space explorations bring back something that will change our lives in some important way? Or, will a huge number of new jobs be created in trying to stop global warming?

Nobody knows for sure. What we do feel is that the important new innovations will come out of technology\textsuperscript{144} – most of the simple stuff has already been invented, and very few of us are likely to go to our basement workshops or out to our barns and come up with inventions that will change our lives and create thousands of jobs.
The most advanced countries, like the U.S., Canada, and Europe, have a concern. Back in the 1950s I spent a great deal of business time in Britain. We had long discussions on business development and when Britain's problems were pointed out, the answer - with a superior air - was, "Oh, Britain will always muddle through." We know it didn't and Japan became the world's second largest economy. Today, when this discussion is held in the U.S., all too often the answer comes back, "Yes, but Yankee ingenuity will save us."

In a world where most of the innovations are likely to be the products of complicated applied research and expensive semiconductor type fabrication plants, the number of engineers and scientists China and India are training is really frightening.

Am I too alarmist? Maybe. But, to quote the great Intel CEO, Andy Grove, "In the competitive world of today, only the paranoid survive."

DR. KING: That was excellent. We will have questions after our other speakers.

We have a man well known to many of you. He was here last year, and we welcome him back this year. His name is Douglas Barber. He is from McMaster University in Canada. He has held about every office you can


146 DONLEY T. STUDLAR, GREAT BRITAIN: DECLINE OR RENEWAL 26 (Westview Press 1996) (analyzing the "British economic decline, [a] relative economic decline to be sure").


151 Andrew S. Grove, Only The Paranoid Survive: Book Preface, http://www.intel.com/pressroom/kits/bios/grove/paranoid.htm (last visited Sept. 27, 2007) (declaring "I'm often credited with the motto, 'Only the paranoid survive.'").

hold at McMaster, and they are listed in the bio data, so I will not read them. He is also the founder of Genum Corporation, which designs, manufactures, and markets microcircuits. At present, it employs over 600 people. He was president and CEO until his retirement in 2000, and he has continued until recently as a director. So it is a great pleasure and honor to

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153 See id. ("He formerly chaired and is currently a member of McMaster's board of governors.").

154 Id. ("Dr. Douglas Barber is one of the founders of Genum Corporation.").

155 Genum Corporation, CHIPDOCS, http://www.chipdocs.com/manufacturers/GENUM.html (last visited Oct 28, 2007) ("Genum Corporation is a Canadian high technology company which designs, manufactures and markets electronic components, primarily silicon integrated circuits (IC's) and thick-film hybrid circuits, for specialized applications.").


157 Barber Biography, supra note 152.

H. Douglas Barber, born on a Saskatchewan farm, attended the University of Saskatchewan obtaining his B.Sc. with Great Distinction, the Governor General's Gold Medal and a M.Sc. in Electrical Engineering. As an Athlone Fellow and NATO Scholar he received his Ph.D. from Imperial College, University of London in 1965. Dr. Barber began employment at Canadian Westinghouse, Hamilton, Ontario, Canada. In 1973 he was one of the founders of Linear Technology Inc., now known as Genum Corporation, which designs, manufactures and markets microcircuits. Genum has grown profitably at 20% per year and now employs about 650 people. Dr. Barber was President and CEO when he retired in 2000. He continues as a Director. He was a part-time Engineering Physics Professor at McMaster University from 1968 to 1994. In 2001 he was appointed Distinguished Professor-in-Residence. Dr. Barber authored 29 papers and several patents. He speaks frequently on business, technology, learning, innovation and economic development. Dr. Barber was actively involved in Microelectronics initiatives in Canada including the Canadian Semiconductor Technology Conference, the Canadian Microelectronics Corporation, the Sectoral Skills Council, the Canadian Microelectronics Design Association, Micronet and the Strategic Semiconductor Consortium. Dr. Barber's honors include the APEO Engineering Medal, the University of Saskatchewan C.J. Mackenzie Distinguished Graduate Award, the Professional Engineers of Ontario Gold Medal, and Engineer of the Year Award of the Hamilton Engineering Institute. Dr. Barber has received an Honorary Doctorate of Engineering from the University of Waterloo, an Honorary Doctorate of Science from McMaster University, and in 1999 was named Ontario’s Technology Entrepreneur of the Year, receiving the National Citation for Innovation & Technology. This year Dr. Barber was appointed as an Officer of the Order of Canada. He was a Director of the Strategic Microelectronics Consortium, the Canadian Advanced Technology Association, the Hearing Industries Association and the Alberta Microelectronics Corp. He was a member of the Sectoral Skills Council, the Natural Sciences and Engineering Research Council of Canada, the National Innovation Strategy, the Ontario Postsecondary Education Quality Assessment Board and Vice Chair of the Ontario Science and Innovation Council. He was a founding co- chair of the National Information Technology Initiative that sponsored eMPOWR Canada Inc. in 2001, and is a past director of the Golden Horseshoe Venture Forum. He is a member of the Electrochemical Society, the Institute of Electrical and Electronic Engineers, the Hamilton Civic Coalition and the Burlington Post Secondary Task Force. At McMaster University, Dr. Barber is a member of the Board of
present Douglas Barber, again here, for this conference, and we look forward to what you have to say.

CANADIAN SPEAKER

Dr. H. Douglas Barber

DR. BARBER: Thank you, Henry. And thank you, David, for really painting an impressive picture that really gives a great base for me to launch out on something that may be a little bit more academic. I may even wade into the world of law, which I know almost nothing about; what I have learned from a few fights in the courts is that legal fights can be very, very expensive!

Because I am in an academic institution these days, I can take a little bit more academic approach to things. Economic growth, wealth, and job creation come from specialization and trade. Self-sufficiency, which is the opposite of specialization, has real limits, both in terms of what one person can do and what they have to do it with.

I grew up on a pioneer farm in Saskatchewan, a province in Canada immediately north of Montana and North Dakota, where it gets cold in the winter and hot in the summer. It was in the depression and drought of the 1930s. Farms were less specialized than they were in the 1920s.

158 USAID Guidebook: Foreign Aid in the National Interest, Ch. 2 Driving Economic Growth (2003), available at http://www.usaid.gov/fani/ch02/newthinking.htm ("Economists have conceptualized the process of economic growth around three basic models: specialization and trade, investment in machines, and increasing returns to knowledge.").


161 See 1930s Drought, CBC News Online, In Depth: Agriculture, http://www.cbc.ca/news/background/agriculture/drought1930s.html (last visited Oct. 15, 2007) (discussing Canada in the 1930s and stating "1930 was the start of a 10-year period of drought").