

# Ray Kurzweil - Keynote Speaker

## Sample Topics, Title, and Abstracts

Ray Kurzweil is best known for presenting a thought provoking, long-term, big picture view of the future of technology and its implications for society; explaining the exponential growth of technology (what he calls, "The Law of Accelerating Returns") and its path towards ubiquitous computing, reverse engineering the brain, full immersion virtual reality, nanotechnology, the merging of human and machine, and ultimately extreme human life extension. He describes a bright future in which technology will provide solutions to the most pressing social, economic, and environmental problems. These ideas form the core thesis of Mr. Kurzweil's lectures and his latest book *The Singularity is Near: When Humans Transcend Biology* (Viking).

After gathering background information about the event, the audience, and the host, Mr. Kurzweil is happy to (and accustomed to) tailor his speech. Mr. Kurzweil often shapes his presentations around the following topics:

**Health and Longevity** - Since the release of his book, *Fantastic Voyage: Live Long Enough to Live Forever* (2004) and with the upcoming release of a new health book, *TRANSCEND: Nine Steps to Living Well Forever* (2009), Mr. Kurzweil addresses many medical and health related audiences on the merger of science, technology, and medicine and its impact on the healthcare industry and human longevity. He explains that as medicine becomes an information technology it will be subject to the laws of accelerating returns, meaning that it will be a thousand times more powerful than today in ten years, and a million times more powerful in 20 years. For more information on this topic, please see: <http://www.fantastic-voyage.net/>.

**Education** - Mr. Kurzweil presents to many academic groups including educators, administrators, executive boards, and higher education IT specialists about the intersection of information technology (a broad perspective), education and human knowledge. He describes a future in which there is widespread and inexpensive access to education around the world, individualized learning through computer assisted instruction, full-immersion virtual reality classrooms and labs, and ultimately the ability to download knowledge and skills directly to our brains. He remarks on the key role of education in supporting the unique attribute of our species which is an exponential expanding knowledge base that we pass down from generation to generation. He notes that as jobs are destroyed at the bottom of the skill ladder and more satisfying and better paying jobs are added at the top, investment in education has increased to keep pace with the rising skill ladder. Specifically, in 1870 there were 60,000 college students and today there are over 6 million. Expenditures in K-12 education in constant dollars and on a per capita basis have multiplied by ten over the past century. Our economy is increasingly dominated by

knowledge intensive jobs hence the increasingly central role of education and educational technology.

**Innovation/Invention** - As one of the leading inventors of our time, Ray was the principal developer of the first CCD flat-bed scanner, the first omni-font optical character recognition, the first print-to-speech reading machine for the blind, the first text-to-speech synthesizer, the first music synthesizer capable of recreating the grand piano and other orchestral instruments, and the first commercially marketed large-vocabulary speech recognition. Mr. Kurzweil has a presentation that describes a program for innovation, how to foster it in an organization, and how to bring inventions to market. He explains how the law of accelerating returns and the exponential growth of information technology are accelerating opportunities for innovation. In this talk, he draws upon his own history of innovation which led to his induction into the National Inventors Hall of Fame, founded by the U.S. Patent Office in 2002.

**Business/Investing** - Mr. Kurzweil frequently presents to private equity firms and businesses on technology and the capital markets, business and technology trends, near- and long-term predictions, and strategy in an age of exponential technological growth. Despite the current economic turmoil, Mr. Kurzweil presents an optimistic argument that the exponential growth of information technology will continue unaffected during the economic downturn as it has in every past recession and during the Great Depression, noting that information technology goes beyond just computerized devices, but includes such disparate areas as health and medicine, and energy. In every past recession and the Great Depression, he notes that economic growth snapped back to where it would have been had the downturn never occurred. He presents an incredible wealth of data showing that information technologies have the scale and the ability to overcome the major problems we face such as energy and the environment, health, and even poverty.

**Disabilities and Assistive Technologies** - Mr. Kurzweil explains that accelerating information technology will lead us to completely overcome handicaps associated with sensory and physical disabilities and describes the extent to which we have already done that for many handicaps. He predicts that in about a quarter century we will have millions of nanobots in our brains putting our brains on the Internet and providing high bandwidth communication directly with the brain, so vision will ultimately become obsolete. He can speak on a range of topics relating to blindness, disabilities, and assistive technologies in the 21st century. With his many assistive technology firsts, among them: the first pocket-sized print-to-speech reading machine for the blind (2006), the first Continuous Speech Natural Language Command and Control Software (1997), the first Speech Recognition Dictation System for Windows (1994), the first commercially marketed Large-Vocabulary Speech Recognition, the first Omni-Font (any type font) Optical Character Recognition (1976), and the first Print-to-Speech Reading Machine for the Blind (1976), Mr. Kurzweil speaks from experience about the future of disabilities in an age of accelerating technology.

## **Speech Titles**

### **On the Future:**

*Accelerating to the Singularity*

*Science, Technology, and Invention: Strategies to Create the Future*

*Early in the Twenty-First Century, Intelligence will Underlie Everything of Value*

*The Singularity is Near: When Humans Transcend Biology*

*The Acceleration of Technology in the 21st Century: the Impact on Business, the Economy, and Society*

*The Acceleration of Technology in the 21st Century: the Impact on Media, Communications, and Society*

*The Next 20 Years of Gaming*

*Transformation and the Pace of Change*

*An Exponentially Expanding Future from Exponentially Shrinking Technology*

*The Web Within Us: When Minds and Machines Become One*

*The Ubiquity and Predictability of the Exponential Growth of Information Technology*

### **On Health/Longevity:**

*TRANSCEND: Nine Steps to Living Well Forever*

*The Acceleration of Technology in the 21st Century: the Impact on Healthcare and Medicine*

*The Democratization of Health and Medicine in an Era of Accelerating Technologies*

*Human Body Version 2.0: When Humans Transcend Biology*

*Reprogramming Biology: The New Paradigm*

*A Bridge to a Bridge to a Bridge...to Extreme Life Extension*

*How to Live Long Enough to Live Forever*

*The Coming Merger of Human and Machine: the Radical Expansion of Human Longevity and Intelligence*

*Reverse Engineering the Human Body and Brain -- The Impact on Human Health and Society*

*Biotechnology and Nanotechnology: Two Overlapping Health Revolutions*

*The Impact of 21st Century Technology on Human Health and Society*

*Extending our Vision and our Life Expectancy through Accelerating Technologies*

*The Exponential Growth of Information Technology: The Impact on Health Care, the Economy, and Policy in the Early 21<sup>st</sup> Century*

**On Innovation & Entrepreneurship:**

*The Democratization of Innovation and Design in an Era of Accelerating Technologies*

*How to Manage Innovation in an Era of Accelerating Technologies*

*Identifying an Opportunity in Technology*

*Innovation in an Era of Accelerating Technologies*

*The Power of an Idea*

*The Democratization of Creativity*

**On the Social Impact of Technology:**

*Towards Singularity - it's Nature, Promise, and Dangers*

*How Far will Technology Transform Humanity?*

*Promise and Peril - The Deeply Intertwined Poles of 21st Century Technology*

*Computers and Consciousness*

*Virtual Reality and the Nature of Identity*

*Are We Spiritual Machines?*

**On the Economic Impact of Technology:**

*The Acceleration of Technology in the 21st Century: the Impact on Business, the Economy, and Society*

*21st Century Technology and the Capital Markets*

*Exponentially Growing Ventures from Exponentially Shrinking Technology*

*An Integrated World Economy in an Age of Accelerating Information Technology*

**On Education:**

*The Acceleration of Technology in the 21st Century: the Impact on Education, Training, and Performance*

*The Acceleration of Technology in the 21st Century: the Impact on Higher Education and Society*

**On Engineering and the Environment:**

*From Unlimited Clean Energy to Overcoming Disease: How Engineering Can Do It*

**On Music:**

*Accelerating Technology: The Impact on Music and Human Life*

**On Disabilities and Assistive Technologies:**

*Technology Empowers People with Disabilities: Today and Tomorrow*

*The End of Handicaps*

*Disabilities and Technology in the 21st Century*

*The Future of Blindness and Disabilities in an Age of Accelerating Technology*

*Technology, Neuroscience and the Future of Cognitive Disabilities*

*The Future of Special Education in an Era of Accelerating Technology*

*Speech Technology and the Emergence of Intelligent Machines*

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## **Sample Abstracts:**

### **Technology and the future (full):**

The paradigm shift rate is now doubling every decade, so the twenty-first century will see 20,000 years of progress at today's rate. Computation, communication, biological technologies (for example, DNA sequencing), brain scanning, knowledge of the human brain, and human knowledge in general are all accelerating at an even faster pace, generally doubling price-performance, capacity, and bandwidth every year. The well-known Moore's Law is only one example of many of the inherent acceleration underlying this "law of accelerating returns." The size of the key features of technology is also shrinking, at a rate of about 4 per linear dimension per decade. Three-dimensional molecular computing will provide the hardware for human-level "strong" AI well before 2030. The more important software insights will be gained in part from the reverse-engineering of the human brain, a process well under way.

We are rapidly learning the software programs called genes that underlie biology. We are understanding disease and aging processes as information processes, and are gaining the tools to reprogram them. RNA interference, for example, allows us to turn selected genes off, and new forms of gene therapy are enabling us to effectively add new genes. Within one to two decades, we will be in a position to stop and reverse the progression of disease and aging resulting in dramatic gains in health and longevity.

The fraction of value of products and services comprised by software and related forms of information is rapidly asymptoting to 100 percent. The deflation rate for information technologies, both hardware and software, is about 50 percent per year, providing a powerful deflationary force in the economy. The portion of the economy comprised of information technology is itself growing exponentially and within a couple of decades, the bulk of the economy will be dominated by information and software.

As information technology achieves each new level of price-performance and capacity, new applications become feasible and existing business models lose their viability. The business models for the media industries (music, movies, newspapers, magazines, television, radio) are already under siege. Medicine is now in the early stages of a profound transformation from hit or miss techniques to precise strategies that reprogram the information processes underlying disease and aging. Ultimately every industry will be transformed as it becomes increasingly subject to the law of accelerating returns. The rate of change is now so rapid that even three to five year business plans need to consider that every level of an industry will undergo major changes during that period. It is feasible, however, to precisely predict the capabilities of each form of information technology in future periods and to factor these projections into entrepreneurial plans.

Once nonbiological intelligence matches the range and subtlety of human intelligence, it will necessarily soar past it because of the continuing acceleration of information-based technologies, as well as the ability of machines to instantly share their knowledge. Intelligent nanorobots will be deeply integrated in the environment, our bodies and our brains, providing vastly extended longevity, full-immersion virtual reality incorporating all of the senses, experience "beaming," and enhanced human intelligence. The implication will be an intimate merger between the technology-creating species and the evolutionary process it spawned.

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### **Technology and the future (brief - 130 words):**

The paradigm shift rate is now doubling every decade, so the twenty-first century will see 20,000 years of progress at today's rate. Three-dimensional molecular computing will provide the hardware for human-level "strong" AI well before 2030. Within one to two decades, we will be in a position to stop and reverse the progression of disease and aging resulting in dramatic gains in health and longevity. The portion of the economy comprised of information technology is itself growing exponentially and within a couple of decades, the bulk of the economy will be dominated by information and software. Once nonbiological intelligence matches the range and subtlety of human intelligence, it will necessarily soar past it. The implication will be an intimate merger between the technology-creating species and the evolutionary process it spawned.

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### **Technology and the future (social/philosophical ramifications):**

At the onset of the 21st century, it will be an era in which the very nature of what is means to be human will be both enriched and challenged, as our species breaks the shackles of its genetic legacy, and achieves inconceivable heights of intelligence, material progress, and longevity. The paradigm shift rate is now doubling every decade, so the twenty-first century will see 20,000 years of progress at today's rate. Computation, communication, biological technologies (for example, DNA sequencing), brain scanning, knowledge of the human brain, and human knowledge in general are all accelerating at an even faster pace, generally doubling price-performance, capacity, and bandwidth every year. Three-dimensional molecular computing will provide the hardware for human-level "strong" AI well before 2030. The more important software insights will be gained in part from the reverse-engineering of the human brain, a process well under way. While the social and philosophical ramifications of these changes will be profound, and the threats they pose considerable, celebrated futurist Ray Kurzweil presents an inspiring vision of our ultimate destiny in which we will merge with our machines, can live forever, and are a billion times more intelligent...all within the next three to four decades.

### **Technology and the future (questions):**

What is the Law of Accelerating Returns and how will it transform society? What are the challenges and opportunities of transcending biology: of nanobots, fuel cells, and bioterrorism? How will businesses manage innovation in an era of accelerating technologies? As information technology asymptotes to 100% of the value of products and services, how will business models and strategies change? When and how will human level AI be developed? How will biotechnology and nanotechnology impact our bodies and brains? When will we see full immersion virtual reality and how will it impact business? Renowned inventor, entrepreneur, best-selling author, widely sought after speaker and futurist, Ray Kurzweil will expand your mind as he shares his vision of the future.

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### **Health and life extension:**

The leading causes of death (heart disease, cancer, stroke, diabetes, kidney disease, liver disease) do not appear out of the blue. They are the end result of processes that are decades in the making. You can understand where you are personally in the progression of these processes and end (and reverse) the lethal march towards these diseases. Through personalized interventions, longstanding imbalances in our metabolic processes can be corrected before you "fall off the cliff." This information is not "plug and play," but the knowledge is available and can be applied through a comprehensive and concerted effort. These interventions constitute a bridge to the full blossoming of the biotechnology revolution, which in turn will be a bridge to the nanotechnology--AI (artificial intelligence) revolution. In combination, these revolutions will radically redefine our concept of human mortality.

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### **Innovation:**

The democratization of innovation is a turbulent process. Rapid creation and violent destruction. Many winners and many losers, both big and small. Are there patterns of success in the chaos? Ray Kurzweil definitely thinks so. He has been on the bleeding edge of innovation for decades and his track record is something to admire. Ray was the principal developer of the first CCD flat-bed scanner, the first omni-font optical character recognition, the first print-to-speech reading machine for the blind, the first text-to-speech synthesizer, the first music synthesizer capable of recreating the grand piano and other orchestral instruments, and the first commercially marketed large-vocabulary speech recognition. Ray is an ardent student of technology trends and had developed mathematical models of how technology in different areas evolves. These models show that the pace of innovation itself is doubling every decade. As information technology achieves each new level of price-performance and capacity, new applications become feasible and existing business models lose their viability. The rate of change is now so rapid that even three to five year business plans need to consider that every level of an

industry will undergo major changes during that period. Ray will talk about the democratization of innovation in an era of accelerating technologies and how this will impact business, the economy, and society.

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### **Merging of human and machine:**

Sometime early in this century the intelligence of machines will exceed that of humans. Within a quarter of a century, machines will exhibit the full range of human intellect, emotions and skills, ranging from musical and other creative aptitudes to physical movement. They will claim to have feelings and, unlike today's virtual personalities will be very convincing when they tell us so. By around 2020 a \$1,000 computer will at least match the processing power of the human brain. By 2029 the software for intelligence will have been largely mastered, and the average personal computer will be equivalent to 1,000 brains. Once computers achieve a level of intelligence comparable to that of humans, they will necessarily soar past it.

Before this century is over, the Law of Accelerating Returns tells us, Earth's technology-creating species-us-will merge with our own technology. And when that happens, we might ask: What is the difference between a human brain enhanced a million fold by neural implants and a nonbiological intelligence based on the reverse-engineering of the human brain that is subsequently enhanced and expanded?

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### **Education:**

The paradigm shift rate is now doubling every decade, so the twenty-first century will see 20,000 years of progress at today's rate. Computation, communication, biological technologies (for example, DNA sequencing), brain scanning, knowledge of the human brain, and human knowledge in general are all accelerating at an even faster pace, generally doubling price-performance, capacity, and bandwidth every year. The size of the key features of technology is also shrinking, at a rate of about 4 per linear dimension per decade. Three-dimensional molecular computing will provide the hardware for human-level artificial intelligence well before 2030. The more important software insights will be gained in part from the reverse-engineering of the human brain, a process well under way.

As with all of our other institutions we will ultimately move toward a decentralized educational system in which every person will have ready access to the highest-quality knowledge and instruction. We are now in the early stages of this transformation, but already the advent of the availability of vast knowledge on the Web, useful search engines, high-quality open Web courseware, and increasingly effective computer-assisted instruction are providing widespread and inexpensive access to education.

The cost of the infrastructure for high-quality audiovisual Internet-based communication is continuing to fall rapidly, at a rate of about 50 percent per year. By the end of the decade it will be feasible for underdeveloped regions of the world to provide very inexpensive access to high-quality instruction for all grade levels from preschool to doctoral studies. Access to education will no longer be restricted by the lack of availability of trained teachers in each town and village.

As computer-assisted instruction (CAI) becomes more intelligent the ability to individualize the learning experience for each student will greatly improve. New generations of educational software are capable of modeling the strengths and weaknesses of each student and developing strategies to focus on the problem area of each learner.

In the early part of the second decade of this century visual-auditory virtual-reality environments will be full immersion, very high resolution, and very convincing. Students will increasingly attend classes virtually. Virtual environments will provide high-quality virtual laboratories where experiments can be conducted in chemistry, nuclear physics, or any other scientific field. Students will be able to interact with a virtual Thomas Jefferson or Thomas Edison or even to *become* a virtual Thomas Jefferson. Classes will be available for all grade levels in many languages. The devices needed to enter these high-quality, high-resolution virtual classrooms will be ubiquitous and affordable even in third world countries. Students at any age, from toddlers to adults, will be able to access the best education in the world at any time and from any place.

The nature of education will change once again when we merge with nonbiological intelligence. We will then have the ability to download knowledge and skills, at least into the nonbiological portion of our intelligence. Our machines do this routinely today. If you want to give your laptop state-of-the-art skills in speech or character recognition, language translation, or Internet searching, your computer has only to quickly download the right patterns (the software). We don't yet have comparable communication ports in our biological brains to quickly download the interneuronal connection and neurotransmitter patterns that represent our learning. That is one of many profound limitations of the biological paradigm we now use for our thinking, a limitation we will overcome.

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### **Virtual Reality:**

The paradigm shift rate is now doubling every decade, so the twenty-first century will see 20,000 years of progress at today's rate. Computation, communication, biological technologies (for example, DNA sequencing), brain scanning, knowledge of the human brain, and human knowledge in general are all accelerating at an even faster pace, generally doubling price-performance, capacity, and bandwidth every year. By 2020, full-immersion virtual reality will be a vast playground of compelling environments and experiences. Initially VR will have benefits in terms of enabling communications with

others in engaging ways over long distances and featuring a great variety of environments from which to choose. By the late 2020s virtual environments will be indistinguishable from real reality and will involve all of the senses, as well as neurological correlates of our emotions. As we enter the 2030s there won't be a clear distinction between human and machine, between real and virtual reality; or between work and play. Intelligent nanorobots will be deeply integrated in the environment, our bodies and our brains, providing full-immersion virtual reality incorporating all of the senses, experience "beaming," and enhanced human intelligence.

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### **Technology and Disabilities**

Only technology can provide the scale to overcome the challenges with which human society has struggled for generations. Within a couple of decades non-biological intelligence will match the range and subtlety of human intelligence and will necessarily soar past it because of the continuing acceleration of information-based technologies, as well as the ability of machines to instantly share their knowledge. Intelligent nanorobots will be deeply integrated in the environment, our bodies and our brains, providing vastly extended longevity, full-immersion virtual reality incorporating all of the senses, experience 'beaming', and enhanced human intelligence. These emerging technologies will be a great leveler in eliminating the handicaps associated with sensory and physical disabilities.

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### **Music:**

Music is the only cultural expression common to every human society that we are aware of. Musical expression has always used the most advanced technologies available, from ancient drums, the cabinet-making crafts of the eighteenth century, the mechanical linkages of the nineteenth century, the analog electronics of the mid twentieth century, the digital technology of the 1980s and 1990s to the artificial intelligence coming in the twenty-first century. Communication bandwidths, the shrinking size of technology, our knowledge of the human brain, and human knowledge in general are all accelerating. Three-dimensional molecular computing will provide the hardware for human-level "strong" AI well before 2030. The more important software insights will be gained in part from the reverse-engineering of the human brain, a process well under way. Once nonbiological intelligence matches the range and subtlety of human intelligence, it will necessarily soar past it because of the continuing acceleration of information-based technologies, as well as the ability of machines to instantly share their knowledge. The impact of these developments will deeply affect all human endeavors. Music will remain the communication of human emotion and insight through sound from musicians to their audience, but the concepts and process of music will be transformed once again.

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