

# Sample Titles and Abstracts

## Ray Kurzweil - Keynote Speaker

### **On the Future:**

*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 Accelerating Future of Information*

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

*The Democratization of Innovation and Design*

*The Democratization of Creativity*

*The Accelerating Impact of Exponentially Expanding Complex Systems*

*The Emergence and Impact of Intelligent Machines*

*An Exponentially Expanding Future from Exponentially Shrinking Technology*

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

*Why We Can Be Confident of Turing Test Capable AI Within a Quarter Century*

*The Law of Accelerating Returns and the 21st Century*

### **Health/Longevity:**

*Reprogramming Biology: The New Paradigm*

*A Bridge to a Bridge to a Bridge...to Immortality*

*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*

**Innovation & Entrepreneurship:**

*The Democratization of Innovation 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 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?*

**Economic Impact:**

*The Future of Information Technology as it Asymptotes to 100% of the Value of Products and Services*

*Exponentially Growing Ventures from Exponentially Shrinking Technology*

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

*21st Century Technology and the Capital Markets*

## **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*

## **Disabilities and Assistive Technologies:**

*The End of Handicaps*

*Disabilities and Technology in the 21st Century*

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

*Disabilities and Blindness Technology in the 21st Century*

*Technology, Neuroscience and the Future of Cognitive Disabilities*

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

## **Sample Abstracts:**

### **Technology and the future:**

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):**

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.

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. 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.

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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### **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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## **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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