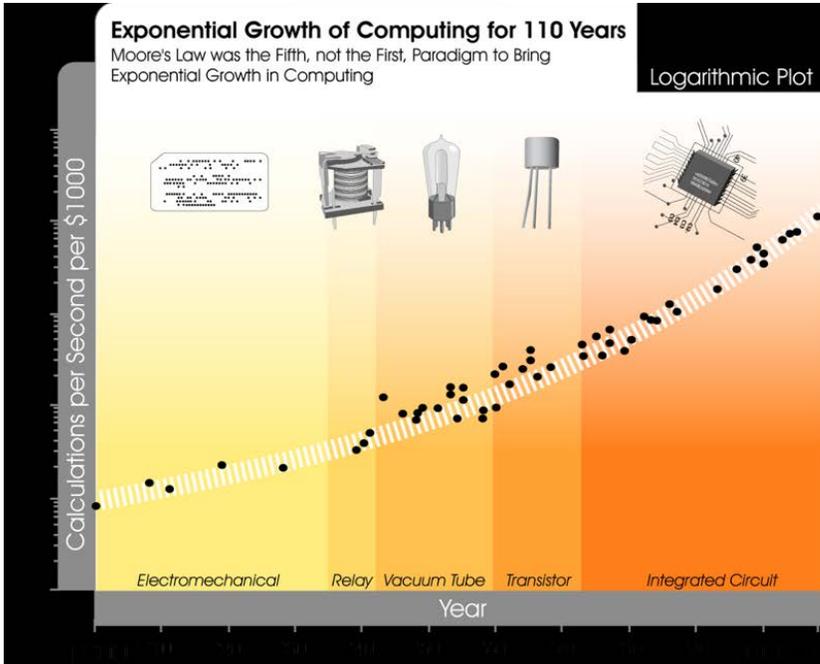




FUTURE GAZING

Rob Nail
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Technology is Accelerating—and Disrupting Everything



Technology is disrupting every part of our lives, businesses, industries and society as a whole.



Ray Kurzweil, Author, Futurist
Cofounder, Singularity University

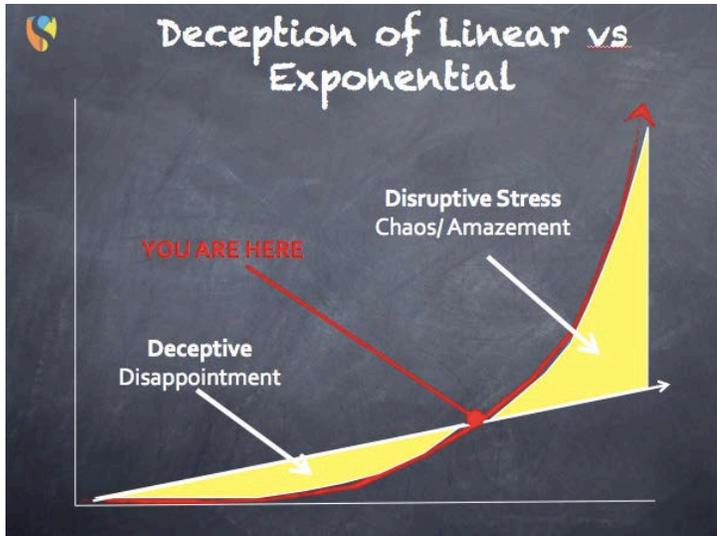
The **FUTURE** (assumptions)

1. **Knowledge & Content** will be **abundant** and instantly accessible everywhere.
2. **Wearables & Quantified Self** are going to be ubiquitous.
3. The Robot Overlords are looking for jobs—A.I. is coming to form.
4. Our Education system is not broken—it's **obsolete** (same for politics, finance, etc.).
5. It's time to enter the 'Matrix' and control it with your Mind—**BCI** is real.
6. **Digital Manufacturing** will revolutionize industries, supply chains and economies.
7. **Security & Privacy** are...different.
8. You will be able to get anything in 30 min or less.
9. **Jobs** will go away due to technological disruption.



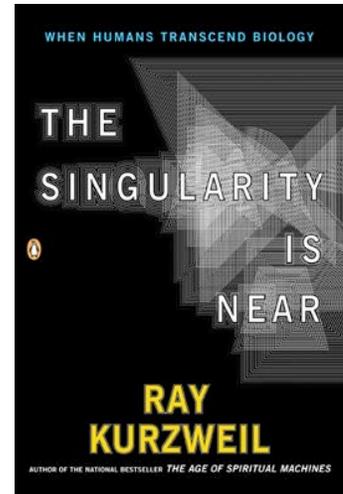
Singularity University's mission is to educate, inspire and empower leaders to understand and utilize exponentially advancing technologies to address humanity's grand challenges.

Exponential Growth is Deceptive



- **Exponential growth is not intuitive** and can be very deceptive. This often leads to dramatically incorrect assumptions about the future—
 - Typically overly optimistic in the short term and overly conservative in the long term.
- **“Experts”** in a given field rarely are aware of the level of innovation and breakthroughs in their field, let alone parallel fields that may converge together.
- Leading **analysts** rarely are aware of exponential pace of change.
- Many of **our existing systems are obsolete**—based on a world hundreds of years ago, with different technological capabilities, social structures and values.
- Existing systems **will not adapt** to the realities of today.
- New **innovations at the edges**, will ultimately replace the core systems that we have in place today.

30 Linear Steps ~ 30M
30 Exponential Steps ~ 1Billion



The Singularity is Near
–Ray Kurzweil, Cofounder
Singularity University



Abundance
–Peter Diamandis, Cofounder
Singularity University

Content Will be Abundant

The “Internet of Things”, the proliferation of mobile devices on a global scale, and the rapid decrease in cost of these devices rapidly takes us to a place where everyone on the planet will have access to a information and learning platforms within the next 20 years. High-speed internet access will be the bottle neck for adoption in rural areas as the device alone is worthless without being connected. Projects like Google Loon attempt to solve this problem at scale.

Wearable Tech Fits

At CES2014, we saw a huge increase in the “Digital Health” technologies, and more than 30 new companies developing varieties of heads-up display technologies. Devices like Google Glass and Fitbit have inspired huge waves of innovation around personal data capture and utilization. Providing real-time information pulled from social sites initially, then ultimately processed by advanced AI tools will created an augmented reality in our everyday lives and interactions. While initial prototypes may be clunky and feel isolating, ultimately, the information layers will allow more personal interactions—especially in profession settings, such as for doctors and patients.

THE FUTURE (assumptions)

1. Knowledge and Content will be abundant and instantly accessible
 - Will need new skills to sort through

Internet of Things (Industrial Internet):
50B Devices by 2025
1 Trillion devices by 2050

THE FUTURE (assumptions)

2. Wearables and Quantified Self are going to be ubiquitous

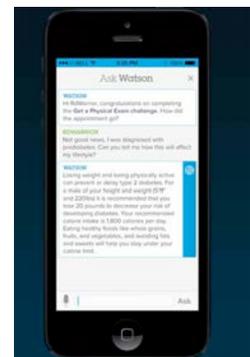
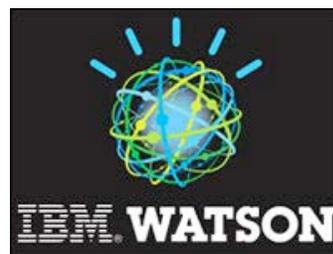
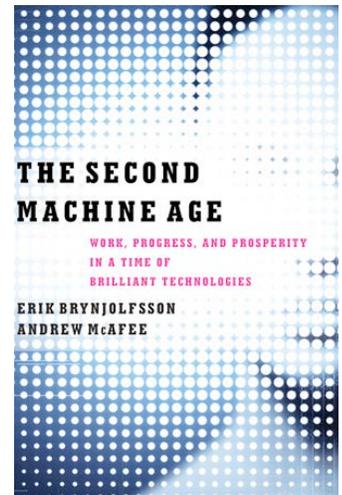


[Sight - http://www.youtube.com/watch?v=GJKwHAvR4uI](http://www.youtube.com/watch?v=GJKwHAvR4uI)

A.I. Comes to Form

Machine learning and algorithms are showing their value in virtually every industry today—enhancing and replacing many, many of the tasks we do. AI is rapidly automating many cognitive tasks that were once considered impossible to do by computer. While this may seem alarming, the potential opportunities that come with AI advances are nothing short of extraordinary. For example, IBM’s Watson won the game show Jeopardy in 2011 in an impressive display of language understanding, structured and unstructured data mining, and processing of probabilities. Then in partnership with [Memorial Sloan-Kettering Cancer Center](#) in 2013, Watson began working on medical decisions. At the end of 2013, IBM announced the IBM Watson Developer Platform, where Watson has essentially been moved to the cloud and developers are invited to develop commercial applications for Watson. Expect great things from this. Also, imagine coupling Watson with all known medical records and the huge wave of quantified self devices that are coming online...keep an eye on the XPrize Foundation’s \$10Million Qualcomm Tricorder Prize for the first portable device to diagnose diseases better than a physician!

**THE FUTURE
(assumptions)**
3. The Robot Overlords
are looking for jobs



Robotics have also made huge strides in the last few years. The DARPA Robotics Challenge is one of many examples of inspiring forums with extraordinary outcomes. Google has recently acquired a suite of robotics companies in what is expected to be another wave of transformative innovation from the company.



Boston Dynamics Atlas



Our Education System (and Many Others) is Obsolete—Moving from Push to Pull

The infrastructure and core elements of our educational system today were established hundreds of years ago and are inappropriate and will not adapt to the realities of today. New innovations that are happening at the edges will ultimately replace the core systems that we have in place today.

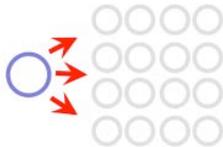
THE FUTURE (assumptions)

4. Our Education system is not broken...it's obsolete. (same for finance, politics, regulatory, etc.)

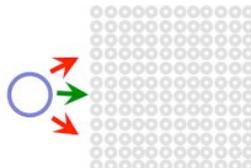
From Push:



One to one

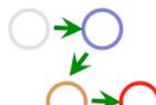


Classroom



MOOC

To Pull:



Peer to peer



Hackschooling



Collaborative Challenge Based Ecosystem

Innovative Technologies Teach

Low cost sensors, mobile computers and AI are being put together to innovate on every front for education. Developing feedback capabilities leads to a future of learning that is personalized for the individual, optimized for their learning style, and adaptable for the context and time.

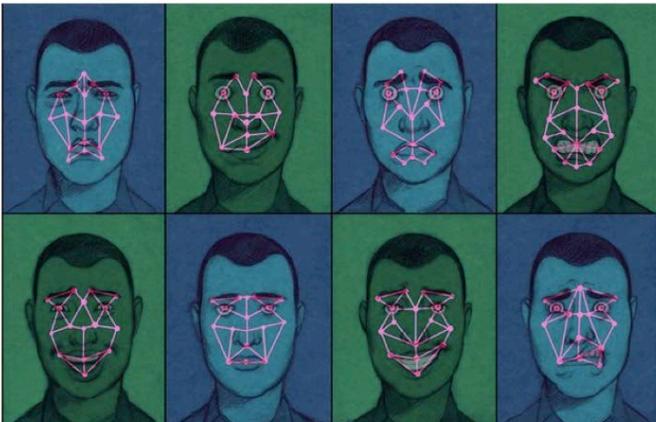
A few interesting examples of technologies (amidst 1000s) are Affectiva, Beyond Verbal, Focus@Will and Google Glass. Add to this, effective machine algorithms and AI like IBM Watson for a disruptive platform that was once relegated to Science Fiction.

THE FUTURE (assumptions)

5. Technology will be a better "teacher" than a human (and doctor, driver, etc.)

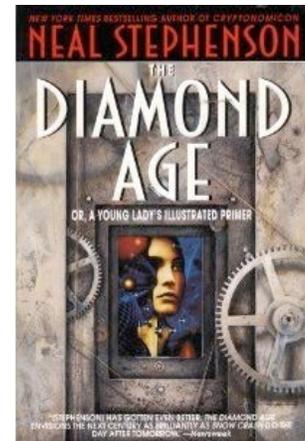
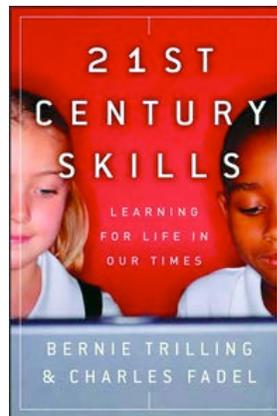
NOVELTIES

When Algorithms Grow Accustomed to Your Face



By ANNE EISENBERG NYTimes: November 30, 2013

Koren Shadmi for The New York Times



Brain—Computer—Interfaces

Surgically implanted devices are being used very successfully in clinical trials by disabled to control a multitude of robotic systems and software interfaces. Striking new work from the University of Harvard and the University of Washington shows incredible development of non-invasive systems connected between individuals and rats and between two individuals respectively. These crude systems point to a very interesting future of non-invasive brain computer interfaces that can control not only software systems, but other biological systems. The rise of non-invasive consumer EEG headsets (Emotiv, Neurosky, etc.) and open-source development communities is accelerating the progress in applicable neuroscience.

Next Wave of Manufacturing

3D printing was barely known just 5 years ago and now is a hot topic with companies like 3D Systems (DDD), Stratasys (SSYS), and Makerbot leading the news. But 3D printing is just the tip of the iceberg of new digital manufacturing technologies that are transforming capabilities, costs, supply chains and locations of manufacturing today.

Low-cost, safe, easy-to-teach robotics are also becoming available to transform assembly operations that were once relegated to low-cost human labor. Rethink Robotics' Baxter is a leading example of a platform that can enhance the capabilities of manufacturing force. BMW's Spartanburg, NC USA car manufacturing facility recently brought Universal Robotics systems online, working alongside manufacturing labor instead of replacing them—an analogy for the future mindset required: **identifying opportunities for enhancing capabilities rather than simply replacing them.**



NIKE FLYKNIT



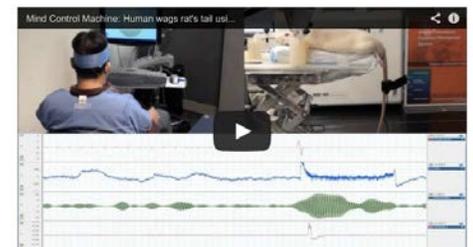
THE FUTURE (assumptions)

6. Time to enter the Matrix and control it with your Mind



Human wags rat's tail using mind control interface

By Olive Sobin | 08 April 13



THE FUTURE (assumptions)

7. Digital Manufacturing will revolutionize industries, supply chains, and economies

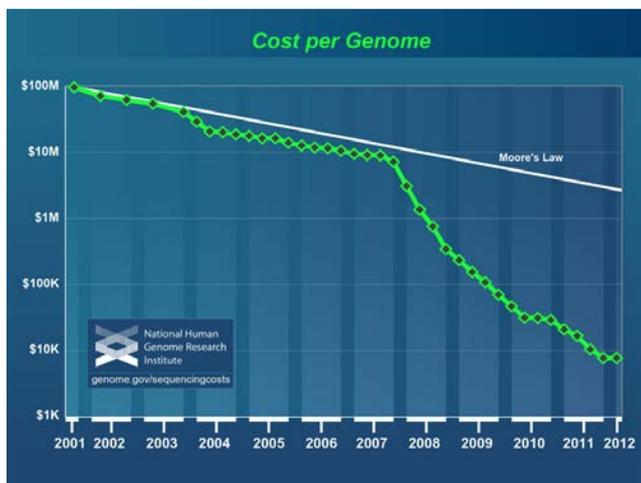


Baxter
Rethink Robotics

Privacy is Long Dead and Security is an Interesting Challenge/Opportunity

The Internet of Things, rise of Wearable Tech, and the rapid decrease in the cost of genomic sequencing means there are huge sources of data to be mined. Question: By whom and for what?!?

Advanced AI Machine algorithms enables incredible capabilities that will likely identify true correlative factors for diseases and cancer, but will also have many unforeseeable side effects of data that we think is private becoming public. The golden rule applies here – if it is connected or online, it can and probably will be public – so take heed!



**Genomic Reading leads to—
Genomic Writing and Synthetic Biology**

THE FUTURE (assumptions)

8. Security & Privacy are...different



May 20, 2010

1st synthetic life **Market:**
1.1 million Basepairs → **FUEL & FOOD & VACCINES**

THE FUTURE (assumptions)

9. Anything delivered to you in 30min or less

Autonomous Transport & Security

Amazon recently popularized the thought of transporting material using Unmanned Aerial Vehicles (UAVs) or drones. This is our preferred weapon for wars and as the technology becomes low cost and more accessible, security questions arise. Realistically, the autonomous vehicle, in testing by Google and now followed by every major car manufacturer, will undoubtedly transform how we get around our cities and how goods are delivered in the next 10 years. Major transformative opportunities exist, but not without some serious security and policy decisions to be made. More public and political discourse and education is needed to create the future we want.



Jobs at Risk

Technology has eliminated jobs for centuries, but new jobs are created in turn. More than 70% of the jobs were in agriculture in the 1840s, and today that number is under 2%—due to the rise of technologies.

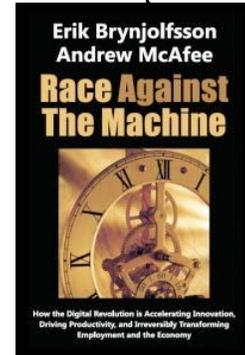
Today, however, the pace of technology will disrupt every industry and will likely result in a gap of jobs that will test our social structures and economic systems.

The Second Machine Age and *Race Against the Machine* are two leading books on technological disruption by two economists from MIT—Andy McAfee and Erik Brynjolfsson. *Robots Will Steal Your Job but That's OK* gives an uplifting outcome to this from our GSP alum, Federico Pistono.

Gary Kasparov was the 1st Chess Champion to lose to a computer—Deep Blue in 1997. Subsequently, he did a lot of work with AI and chess tournaments and came up with an conclusion in 2010:

A computer will always beat a person at chess, but a good chess player paired with a computer can beat another computer.

THE FUTURE (assumptions)
 10. Jobs will go away due to technological disruption



Gary Kasparov, *Chess Master & the Computer*, 2010

THE FUTURE (assumptions)
 5. Institutional certification will be replaced by community driven reputation

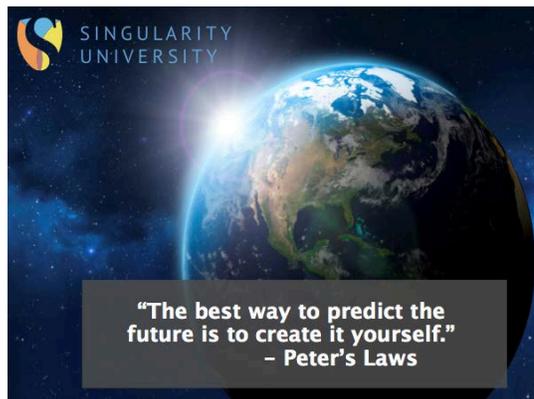
Blurred Lines Between Virtual and Physical

Teleconferencing robotics, virtual office apps, and virtual environment tools are adding new layers of feedback and productivity into work and learning environments. New platforms like the Oculus Development Kit are inspiring new experiments in virtual learning. Moving to virtual windows that are always on to other people or communities eliminates the transactional nature of teleconferences and Skype. Imagine sharing an office with other people sitting next to you through live virtual windows.

“May you live in interesting times” –Ancient Chinese Curse

- 900 Million people live on less than US\$1 per day (3.14 Billion on less than US\$2.50 per day)
- 1.1 Billion people don't have access to clean water
- 800 Million people can not read and write
- Climate change will disrupt every city and industry to untold and potentially devastating degrees in the next 30 years

These are not technological problems, but issues that can be positively impacted with new technological solutions. However, it will require great personal, social, and political courage to solve these problems. It's to start the discussion about the implications and opportunities of exponentially accelerating technologies.



THE FUTURE (assumptions)

6. Virtual environments & communities will rival physical



Singularity University's mission is to educate, inspire and empower leaders to understand and utilize exponentially advancing technologies to address humanity's grand challenges.

Websites

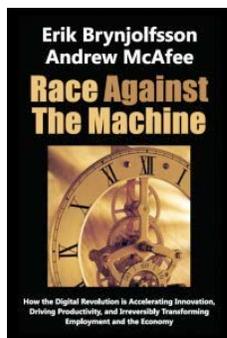
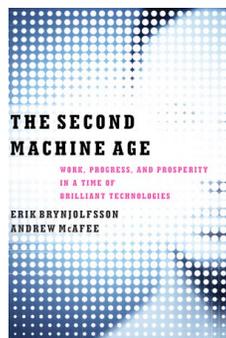
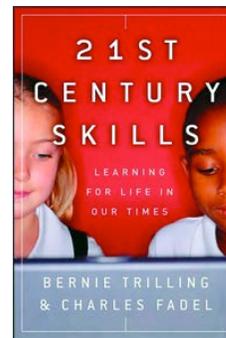
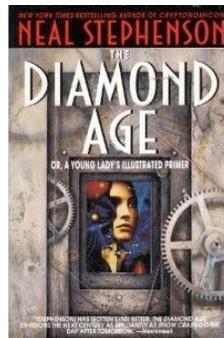
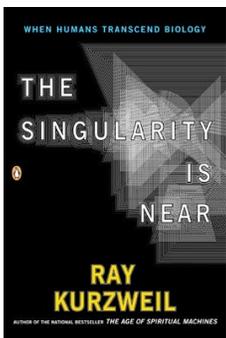
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Books



How will you positively impact **10⁹+**
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