



THE CHALLENGE OF CHANGE

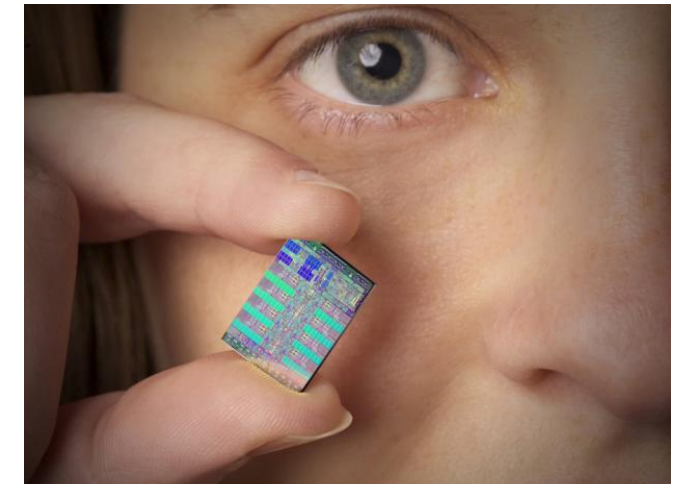




1000 x the power and 1/1,000,000 the cost

1971 – 92 thousand calcs per second
 1981 – 6 million calcs per second
 1991 – 50 million calcs per second
 2015 – 33,860 trillion calcs per second
 2018 – 200 quadrillion calcs per second
 2022 – 1 trillion calcs per second

**Supercomputer Can Calculate in 1
 Second What Would Take a Human
 Brain 6 Billion Years**



**Intel teraflop chip matches supercomputer
 performance**

EVERYTHING DEPENDS ON LEARNING

Changing how we think about learning can change how we learn about everything.



A Billion-Fold and Accelerating



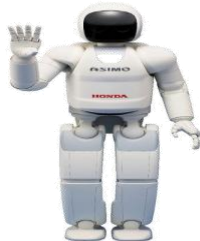
Do You Love Me Now That I Can Dance?



AMECA and SOPHIA



3D PRINTING AND THE FUTURE



Forbes

TECH | 5/21/2013 @ 12:01AM | 27,279 views

IBM's Watson Now A Customer Service Agent, Coming To Smartphones Soon

It took Twitter 3 years, 2 months and 1 day to hit a billion tweets. They now hit a billion every 3 days.

Meta

UNREAL ESTATE



Microsoft HoloLens



DB Invisor

WIRED

AUTOPIA

Ford Unveils Its First Autonomous Vehicle Prototype



The internet of things and smart cities: Will an IBM computer be your next mayor?

By Sebastian Anthony on April 26, 2012 at 10:49 am



When we think of computer networks, we think of routers and servers and fiber optic cables and laptops and smartphones — we think of *the internet*. In actuality, though, the visible internet is just the tip of the iceberg. There are secret military networks, and ad hoc wireless networks, and utility companies have sprawling, cellular networks the track everything from the health of oil pipelines and uranium enrichment machines through

THE FUTURE OF JOBS

THE FUTURE OF EDUCATION

G\$ \$gle

PEW RESEARCH: AI, Robotics & the Future of Jobs

Brain-computer interfaces turn thoughts into text



There will be ever fewer opportunities for human beings who can only perform repetitive manual labor, remember facts, or perform routine intellectual functions.





AUGUST 6, 2014

AI, Robotics, and the Future of Jobs

BY AARON SMITH AND JANNA ANDERSON



Key Findings

Some **1,896 experts** responded to the following question:

Will networked, automated, artificial intelligence (AI) applications and robotic devices have displaced more jobs than they have created by 2025?

Half envision a future in which robots and digital agents have displaced significant numbers of both blue- and white-collar workers—with many expressing concern that this will lead to **vast increases in income inequality, masses of people who are effectively unemployable, and breakdowns in the social order.**

Half anticipate that **many jobs currently performed by humans will be substantially taken over by robots or digital agents by 2025.** But they have faith that human ingenuity will create new jobs, industries, and ways to make a living, just as it has been doing since the dawn of the Industrial Revolution.

“Everything that can be automated will be automated.”

“The central question of 2025 will be: What are people for in a world that does not need their labor, and where only a minority are needed to guide the ‘bot-based’ economy?”

All agree:

- Impacts from automation have thus far impacted mostly blue-collar employment; **the coming wave of innovation threatens to upend white-collar work as well.**
- Certain highly-skilled workers will succeed wildly in this new environment—but **far more may be displaced into lower paying service industry jobs at best, or permanent unemployment at worst.**
- **Our educational system is not adequately preparing us for work of the future,** and our political and economic institutions are poorly equipped to handle these hard choices.



Jobs Of The Future

Routine Cognitive	Routine Manual	Non-Routine Cognitive	Non-Routine Manual
Secretary Office manager General clerk Receptionist Call center operator Proofreader	Mechanic Construction Telco lineperson Factory hand Sales assistant Cleaner Laborer	CEO Lawyer Judge Social Worker Designer Engineer Doctor Nurse Designer Marketing HR staff	Health transportation Waiters Delivery drivers Security staff Personal trainer Beautician Food preparation
<i>Rapidly Declining</i>	<i>Declining</i>	<i>Growing</i>	<i>Rapidly Growing</i>

Easiest to Automate

➔ Hardest to Automate





More Phones, Fewer Doctors

VC legend Vinod Khosla believes that medicine will go mobile and most doctors will be out of a job.

FORTUNE

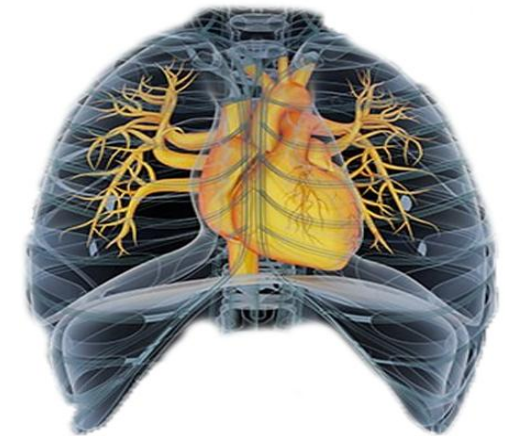


Technology will replace 80% of what doctors do

Data-driven healthcare won't replace physicians entirely, but it will help those receptive to technology perform their jobs better.



WIRELESS IMPLANTABLE MEDICAL DEVICES



AI tool can spot heart disease nearly 40 times faster than doctors.



Curriculum Matters

Man vs. Computer: Who Wins The Essay-Scoring Challenge

Would you rather have an actual person score your carefully crafted essay, or an automated software program designed for that purpose?

Study: 16,000 7th-to-10th grades essays varying in length, type, and grading protocols. The essays had already been human-scored, and the challenge was to approximate established human-grading scores with software.

Results: "automated essay-scoring systems are **fast, accurate, and cost effective** ...capable of producing scores similar to human scores for ***extended-response writing items***"

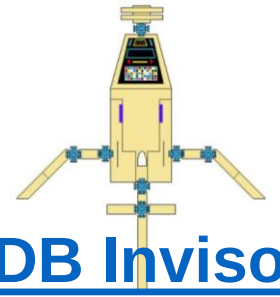
IMPLICATIONS:

- Reduces crudity of 'multiple choice' student measures
- encourages student elaboration
- saves (teacher) labor cost
- Increases detail in student measures



The Future of Education

The Limited Value of Knowledge



DB Invisor



**ON-DEMAND
LEARNING**

